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## SOLUBILITY DATA SERIES

Volume 44

.

## **COPPER AND SILVER HALATES**

## SOLUBILITY DATA SERIES

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A complete list of volumes published in the Solubility Data Series will be found on p. 246.

# **SOLUBILITY DATA SERIES**

Volume 44

# **COPPER AND SILVER HALATES**

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## FOREWORD

If the knowledge is undigested or simply wrong, more is not better.

The Solubility Data Series is a project of Commission V.8 (Solubility Data) of the International Union of Pure and Applied Chemistry (IUPAC). The project had its origins in 1973, when the Analytical Chemistry Division of IUPAC set up a Subcommission on Solubility Data under the chairmanship of the late Prof. A.S. Kertes. When publication of the Solubility Data Series began in 1979, the Committee became a full commission of IUPAC, again under the chairmanship of Prof. Kertes, who also became *Editor-in-Chief* of the Series. The Series has as its goal the preparation of a comprehensive and critical compilation of data on solubilities in all physical systems, including gases, liquids and solids.

The motivation for the Series arose from the realization that, while solubility data are of importance in a wide range of fields in science and technology, the existing data had not been summarized in a form that was at the same time comprehensive and complete. Existing compilations of solubility data indeed existed, but they contained many errors, were in general uncritical, and were seriously out-of-date.

It was also realized that a new series of compilations of data gave educational opportunities, in that careful compilations of existing data could be used to demonstrate what constitutes data of high and lasting quality. As well, if the data were summarized in a sufficiently complete form, any individual could prepare his or her own evaluation, independently of the published evaluation. Thus, a special format was established for each volume, consisting of individual data sheets for each separate publication, and critical evaluations for each separate system, provided sufficient data from different sources were available for comparison. The compilations and, especially, the evaluations were to be prepared by active scientists who were either involved in producing new data, or were interested in using data of high quality. With minor modifications in format, this strategy has continued throughout the Series.

In the standard arrangement of each volume, the Critical Evaluation gives the following information:

(i) A text which discusses the numerical solubility information which has been abstracted from the primary sources in the form of compilation sheets. The text concerns primarily the quality of the data, after consideration of the purity of the materials and their characterization, the experimental method used, the uncertainties in the experimental values, the reproducibility, the agreement with accepted test values, and, finally, the fitting of the data to suitable functions, along with statistical tests of the fitted data.

(11) A set of recommended data, whenever possible, including weighted averages and estimated standard deviations. If applicable, one or more smoothing equations which have been computed or verified by the evaluator are also given.

(111) A graphical plot of the recommended data, in the form of phase diagrams where appropriate.

The Compilation part consists of data sheets which summarize the experimental data from the primary literature. Here much effort is put into obtaining complete coverage; many good data have appeared in publications from the late nineteenth and early twentieth centuries, or in obscure journals. Data of demonstrably low precision are not compiled, but are mentioned in the Critical Evaluation. Similarly, graphical data, given the uncertainty of accurate conversion to numerical values, are compiled only where no better data are available. The documentation of data of low precision can serve to alert researchers to areas where more work is needed.

- A typical data sheet contains the following information:
  - (i) list of components: names, formulas, Chemical Abstracts Registry Numbers;
  - (ii) primary source of the data;
  - (iii) experimental variables;
  - (iv) compiler's name;
    - (v) experimental values as they appear in the primary source, in modern units with explanations if appropriate;
  - (vi) experimental methods used;
  - (vii) apparatus and procedure used;
- (viii) source and purity of materials used;
  - (ix) estimated error, either from the primary source or estimated by the compiler;
  - (x) references relevant to the generation of the data cited in the primary source.

Each volume also contains a general introduction to the particular type of system, such as solubility of gases, of solids in liquids, etc., which contains a discussion of the nomenclature used, the principles of accurate determination of solubilities, and related thermodynamic principles. This general introduction is followed by a specific introduction to the subject matter of the volume itself.

The Series embodies a new approach to the presentation of numerical data, and the details continue to be influenced strongly by the perceived needs of prospective users. The approach used will, it is hoped, encourage attention to the quality of new published work, as authors become more aware that their work will attain permanence only if it meets the standards set out in these volumes. If the Series succeeds in this respect, even partially, the Solubility Data Commission will have justified the labour expended by many scientists throughout the world in its production.

January, 1989

J.W. Lorimer, London, Canada

# PREFACE

The present volume is the third in a series of four volumes on inorganic metal halates. The first volume on Alkaline Earth Metal Halates was published in 1983 (1), and the second volume on Alkali Metal Halates, Ammonium Iodate and Iodic Acid was published in 1987 (2). A fourth volume on Transition Metal, Lanthanide and Other Metal Halates is presently in course of preparation.

This volume includes critical evaluations and compilations for halate solubilities of the Group 11 metals, and the literature was searched up to 1987. The evaluators and compilers were not able to locate solubility data for gold halates or for copper bromate. Thus the solubility data included in this volume are those for the five compounds copper chlorate and iodate, and silver chlorate, bromate and iodate.

To arrive at either recommended or tentative solubilities, we generally appplied a statistical treatment similar to that recommended by Cohen-Adad (3) based on the thermodynamic treatment of saturated solutions and their equilibrated solid phases as discussed in the Introduction to the Solubility of Solids in Liquids found in this volume. These thermodynamic treatments allow one to describe the polytherm for a binary system over the complete range of ice as the solid phase to the melting point of the pure solute by the general expression

$$Y = \frac{A}{T/K} + B\ln(T/K) + C + D(T/K)$$

For convenience of the users, the solubilities can be extracted from the complex Y term in the above equation with the simple computer programs (written in BASIC) listed in the Preface of IUPAC Solubility Data Series, Vol. 30 (2). In several instances involving the solubility of a halate in the presence of a non-saturating component such as a salt or an acid, the data were critically evaluated using a simple power series fitting equation. Generally, data were evaluated when two or more independent studies were available, but there are a few exceptions: e.g. in instances where comparisons were not possible due to differences in units and/or temperature, and where the data were judged to result in averages with large standard deviations such as data for the solubilities of various halates in several organic solvent systems.

We believe the literature search through 1987 is complete, and an incomplete survey of Chemical Abstracts was made through the first half of 1988. In a few instances, relevant papers were not compiled as it was not possible to obtain either reprints or other reproductions of the original publications. For example, we were unable to obtain the papers in references (4) and (5).

The editors would like to acknowledge the cooperation of the American Chemical Society and VAAP, the copyright agency of the USSR, for permission to reproduce figures from their publications.

The editors gratefully acknowledge the advice and comments from members and associates of IUPAC Commission V.8, and in particular to Professors H.L. Clever, R. Cohen-Adad, J.W. Lorimer and C.L. Young. We are also grateful to K. Loening of the Chemical Abstracts Service for providing Registry Numbers for numerous compounds.

One of us (H. M.) would also like to acknowledge the hospitality of Prof. H.L. Clever during his stay at the Solubility Research Center at Emory University (1981-1982), and to Dr. Nobuyuki Tanaka (Professor Emeritus of Tohoku University and President of Nippon Jimuki Co., Ltd.), Profs. H. Akaiwa (Gunma University) and M. Fujii (Niigata University) for their valuable comments and suggestions. This work was partially supported by a Grant-in-Aid of Scientific Research from the Japan Association of Chemistry in 1979 and 1984.

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December, 1989

## PREFACE (continued)

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#### INTRODUCTION TO THE SOLUBILITY OF SOLIDS IN LIQUIDS

#### Nature of the Project

The Solubility Data Project (SDP) has as its aim a comprehensive search of the literature for solubilities of gases, liquids, and solids in liquids or solids. Data of suitable precision are compiled on data sheets in a uniform format. The data for each system are evaluated, and where data from different sources agree sufficiently, recommended values are proposed. The evaluation sheets, recommended values, and compiled data sheets are published on consecutive pages.

#### Definitions

A mixture (1, 2) describes a gaseous, liquid, or solid phase containing more than one substance, when the substances are all treated in the same way.

A solution (1, 2) describes a liquid or solid phase containing more than one substance, when for convenience one of the substances, which is called the solvent, and may itself be a mixture, is treated differently than the other substances, which are called solutes. If the sum of the mole fractions of the solutes is small compared to unity, the solution is called a dilute solution.

The solubility of a substance B is the relative proportion of B (or a substance related chemically to B) in a mixture which is saturated with respect to solid B at a specified temperature and pressure. Saturated implies the existence of equilibrium with respect to the processes of dissolution and precipitation; the equilibrium may be stable or metastable. The solubility of a substance in metastable equilibrium is usually greater than that of the corresponding substance in stable equilibrium. (Strictly speaking, it is the activity of the substance in metastable equilibrium that is greater.) Care must be taken to distinguish true metastability from supersaturation, where equilibrium does not exist.

Either point of view, mixture or solution, may be taken in describing solubility. The two points of view find their expression in the quantities used as measures of solubility and in the reference states used for definition of activities, activity coefficients and osmotic coefficients.

The qualifying phrase "substance related chemically to B" requires comment. The composition of the saturated mixture (or solution) can be described in terms of any suitable set of thermodynamic components. Thus, the solubility of a salt hydrate in water is usually given as the relative proportion of anhydrous salt in solution, rather than the relative proportions of hydrated salt and water.

Quantities Used as Measures of Solubility

1. Mole fraction of substance B,  $x_B$ :

$$x_{B} \neq n_{B} / \sum_{s=1}^{C} n_{s}$$
 [1]

where  $n_B$  is the amount of substance of s, and c is the number of distinct substances present (often the number of thermodynamic components in the system). Mole per cent of B is 100  $x_B$ .

2. Mass fraction of substance B, w<sub>B</sub>:

$$w_{B} = m_{B}' / \sum_{s=1}^{C} m_{s}'$$
 [2]

where  $m_B$  is the mass of substance s. Mass per cent is 100 w<sub>B</sub>. The equivalent terms weight fraction and weight per cent are not used.

3. Solute mole (mass) fraction of solute B (3, 4):

 $x_{s,B} = m_{B} / \sum_{s=1}^{C} m_{s} = x_{B} / \sum_{s=1}^{C} x_{s}$  [3]

$$w_{s,B} = m_{B'} / \sum_{s=1}^{C'} m_{s'} = w_{B} / \sum_{s=1}^{C'} w_{s}$$
 [3a]

where the summation is over the solutes only. For the solvent A,  $x_{S,A} = x_A/(1 - x_A)$ ,  $w_{S,A} = w_A/(1 - w_A)$ . These quantities are called Jänecke mole (mass) fractions in many papers.

4. Molality of solute B (1, 2) in a solvent A:

 $m_B = n_B/n_A M_A$  SI base units: mol kg<sup>-1</sup> [4]

where  $M_A$  is the molar mass of the solvent.

5. Concentration of solute B (1, 2) in a solution of volume V:

 $c_B = [B] = n_B/V$  SI base units: mol m<sup>-3</sup> [5]

The symbol  $c_B$  is preferred to [B], but both are used. The terms molarity and molar are not used.

Mole and mass fractions are appropriate to either the mixture or the solution point of view. The other quantities are appropriate to the solution point of view only. Conversions among these quantities can be carried out using the equations given in Table I-1 following this Introduction. Other useful quantities will be defined in the prefaces to individual volumes or on specific data sheets.

In addition to the quantities defined above, the following are useful in conversions between concentrations and other quantities.

6. Density:  $\rho = m/V$  SI base units: kg m<sup>-3</sup> [6]

7. Relative density: d; the ratio of the density of a mixture to the density of a reference substance under conditions which must be specified for both (1). The symbol  $d_t$  will be used for the density of a mixture at t°C, 1 bar divided by the density of water at t°C, 1 bar. (In some cases 1 atm = 101.325 kPa is used instead of 1 bar = 100 kPa.)

8. A note on nomenclature. The above definitions use the nomenclature of the IUPAC Green Book (1), in which a solute is called  $\beta$  and a solvent A In compilations and evaluations, the first-named component (component 1) is the solute, and the second (component 2 for a two-component system) is the solvent. The reader should bear these distinctions in nomenclature in mind when comparing nomenclature and theoretical equations given in this Introduction with equations and nomenclature used on the evaluation and compilation sheets.

#### Thermodynamics of Solubility

The principal aims of the Solubility Data Project are the tabulation and evaluation of: (a) solubilities as defined above; (b) the nature of the saturating phase. Thermodynamic analysis of solubility phenomena has two aims: (a) to provide a rational basis for the construction of functions to represent solubility data; (b) to enable thermodynamic quantities to be extracted from solubility data. Both these are difficult to achieve in many cases because of a lack of experimental or theoretical information concerning activity coefficients. Where thermodynamic quantities can be found, they are not evaluated critically, since this task would involve critical evaluation of a large body of data that is not directly relevant to solubility. The following is an outline of the principal thermodynamic relations encountered in discussions of solubility. For more extensive discussions and references, see books on thermodynamics, e.g., (5-12).

Activity Coefficients (1)

(a) Mixtures. The activity coefficient  $f_B$  of a substance B is given

$$RT \ln (f_{B} x_{B}) = \mu_{B} = \mu_{B} x_{B}$$
 [7]

where  $\mu_B^*$  is the chemical potential of pure B at the same temperature and pressure. For any substance B in the mixture,

$$\lim_{x_{B} \to 1} f_{B} \leftarrow 1$$
[8]

(b) Solutions.

by

(1) Solute B. The molal activity coefficient  $\gamma_B$  is given by RT ln( $\gamma_B m_B$ ) =  $\mu_B$  - ( $\mu_B$  - RT ln  $m_B$ )<sup> $\infty$ </sup> [9]

where the superscript  $^{\infty}$  indicates an infinitely dilute solution. For any solute B,

γ<sub>B</sub><sup>αα</sup> = 1

[10]

Activity coefficients yg connected with concentrations cg, and  $f_{x,B}$  (called the rational activity coefficient) connected with mole fractions  $x_B$  are defined in analogous ways. The relations among them are (1, 9), where  $\rho^*$  is the density of the pure solvent:

$$f_B = (1 + M_A \sum_{g} m_g) \gamma_B = [\rho + \sum_{g} (M_A - M_g) c_g] y_B / \rho^*$$
[11]

$$\gamma_{B} = (1 - \sum_{s} x_{s}) f_{x,B} = (\rho - \sum_{s} M_{s} c_{s}) Y_{B} / \rho^{*}$$
[12]

$$y_{B} = \rho^{*} f_{X,B} [1 + \sum_{g} (M_{g}/M_{A} - 1) x_{B}] / \rho = \rho^{*} (1 + \sum_{g} M_{g} m_{g}) y_{B} / \rho$$
[13]

For an electrolyte solute  $B = C_{\nu+}A_{\nu-}$ , the activity on the molality scale is replaced by (9)

$$\gamma_{B}m_{B} = \gamma_{\pm}\nu_{m_{B}}\nu_{Q}\nu \qquad [14]$$

where  $\nu = \nu_{+} + \nu_{-}$ ,  $Q = (\nu_{+}^{\nu_{+}}\nu_{-}^{\nu_{-}})^{1/\nu}$ , and  $\gamma_{\pm}$  is the mean ionic activity coefficient on the molality scale. A similar relation holds for the concentration activity,  $y_{BCB}$ . For the mole fractional activity,

$$f_{X,B}x_{B} = Q f_{\pm}^{\nu} f_{\pm}^{\nu} x_{\pm}^{\nu}$$
 [15]

where  $x_{\pm} = (x_{\pm}x_{-})^{1/\nu}$ . The quantities  $x_{\pm}$  and  $x_{-}$  are the ionic mole fractions (9), which are

$$x_{+} = v_{+}x_{B}/[1 + \sum_{g}(v_{g} - 1)x_{g}]; \quad x_{-} = v_{-}x_{B}[1 + \sum_{g}(v_{g} - 1)x_{g}] \quad [16]$$

where  $\nu_{\rm S}$  is the sum of the stoichiometric coefficients for the ions in a salt with mole fraction  $x_{\rm S}$ . Note that the mole fraction of solvent is now

$$x_{A}' = (1 - \sum_{g} v_{g} x_{g}) / [1 + \sum_{g} (v_{g} - 1) x_{g}]$$
[17]

so that

$$\mathbf{x_A}' + \sum_{\mathbf{s}} \mathbf{v_s} \mathbf{x_s} = 1$$
 [18]

The relations among the various mean ionic activity coefficients are:

$$f_{\pm} = (1 + M_{A} \sum_{s} \nu_{s} ms) \gamma_{\pm} = [\rho + \sum_{s} (\nu_{s} M_{A} - M_{s}) c_{s}] y_{\pm} / \rho^{*}$$
[19]

$$\gamma_{\pm} = \frac{(1 - \sum_{s} x_{s})f_{\pm}}{1 + \sum_{s} (\nu_{s} - 1)x_{s}} = (\rho - \sum_{s} M_{s}c_{s})y_{\pm}/\rho^{*}$$
[20]

$$y_{\pm} = \frac{\rho^{*}[1 + \sum_{g}(M_{g}/M_{A} - 1)x_{g}]f_{\pm}}{\rho[1 + \sum_{g}(\nu_{g} - 1)x_{g}]} = \rho^{*}(1 + \sum_{g}M_{g}m_{g})^{\gamma}_{\pm}/\rho \qquad [21]$$

(i1) Solvent, A:

The osmotic coefficient,  $\phi$ , of a solvent A is defined as (1):

$$\phi = (\mu_A^* - \mu_A) / RT M_A \sum m_B \qquad [22]$$

where  $\mu_A^*$  is the chemical potential of the pure solvent.

The rational osmotic coefficient,  $\phi_X$ , is defined as (1):

$$\phi_{X} = (\mu_{A} - \mu_{A}^{*})/RT \ln x_{A} = \phi_{A} \sum_{g} m_{g}/\ln(1 + M_{A} \sum_{g} m_{g})$$
[23]

The activity,  $a_A$ , or the activity coefficient,  $f_A$ , is sometimes used for the solvent rather than the osmotic coefficient. The activity coefficient is defined relative to pure A, just as for a mixture.

For a mixed solvent, the molar mass in the above equations is replaced by the average molar mass; i.e., for a two-component solvent with components J, K,  $M_A$  becomes

$$M_A = M_J + (M_K - M_J) x_{V,K}$$
 [24]

where  $x_{V,K}$  is the solvent mole fraction of component K.

The osmotic coefficient is related directly to the vapor pressure, p, of a solution in equilibrium with vapor containing A only by (12, p.306):

$$\delta M_{AE} v_{S} m_{S} = -\ln(p/p_{A}^{*}) + (V_{m,A}^{*} - B_{AA})(p - p_{A}^{*})/RT$$
 [25]

where  $p_A^*$ ,  $V_{m,A}^*$  are the vapor pressure and molar volume of pure solvent A, and  $B_{AA}$  is the second virial coefficient of the vapor.

#### The Liquid Phase

A general thermodynamic differential equation which gives solubility as a function of temperature, pressure and composition can be derived. The approach is similar to that of Kirkwood and Oppenheim (7); see also (11, 12). Consider a solid mixture containing c thermodynamic components i. The Gibbs-Duhem equation for this mixture is:

$$\sum_{i=1}^{n} x_{i}' (S_{i}' dT - V_{i}' dp + d\mu_{i}') = 0$$
 [26]

A liquid mixture in equilibrium with this solid phase contains c' thermodynamic components i, where c' > c. The Gibbs-Duhem equation for the liquid mixture is:

$$\sum_{i=1}^{C} x_{i}(s_{i}dT - V_{i}dp + d\mu_{i}') + \sum_{i=C+1}^{C'} x_{i}(s_{i}dT - V_{i}dp + d\mu_{i}) = 0 \quad [27]$$

Subtract [26] from [27] and use the equation

$$d\mu_i = (d\mu_i)_{T,p} - S_i dT + V_i dp \qquad [28]$$

and the Gibbs-Duhem equation at constant temperature and pressure:

$$\sum_{i=1}^{C} x_{i}(d\mu_{i}')_{T,p} + \sum_{i=C+1}^{C} x_{i}(d\mu_{i})_{T,p} = 0$$
[29]

The resulting equation is:

$$RT\sum_{i=1}^{C} x_{i}'(dlna_{i})_{T,p} = \sum_{i=1}^{C} x_{i}'(H_{i} - H_{i}')dT/T - \sum_{i=1}^{C} x_{i}'(V_{i} - V_{i}')dp \quad [30]$$

where

$$H_{i} - H_{i}^{*} = T(S_{i} - S_{i}^{*})$$
 [31]

is the enthalpy of transfer of component i from the solid to the liquid phase at a given temperature, pressure and composition, with  $H_i$  and  $S_i$  the partial molar enthalpy and entropy of component 1.

Use of the equations

$$H_i - H_i^0 = -RT^2(\partial \ln a_i / \partial T)_{X,p}$$
[32]

and

$$V_i - V_i^0 = RT(\partial \ln a_i / \partial p)_{X,T}$$
[33]

where superscript o indicates an arbitrary reference state gives:

$$RT \sum_{i=1}^{C} x_{i}' dlna_{i} = \sum_{i=1}^{C} x_{i}' (H_{i}^{0} - H_{i}') dT/T - \sum_{i=1}^{C} x_{i}' (V_{i}^{0} - V_{i}') dp \quad [34]$$

#### where

 $dlna_{i} = (dlna_{i})_{T,p} + (\partial lna_{i}/\partial T)_{X,p} + (\partial lna_{i}/\partial p)_{X,T}$ [35]

The terms involving enthalpies and volumes in the solid phase can be written as:

$$\sum_{i=1}^{C} x_{i}' H_{i}' = H_{s}^{*} \qquad \sum_{i=1}^{C} x_{i}' V_{i}' = V_{s}^{*} \qquad [36]$$

With eqn [36], the final general solubility equation may then be written:

$$R_{i=1}^{C} x_{i}' d \ln a_{i} = (H_{s}^{*} - \sum_{i=1}^{C} x_{i}' H_{i}^{0}) d(1/T) - (V_{s}^{*} - \sum_{i=1}^{C} x_{i}' V_{i}^{0}) dp/T$$
[37]

Note that those components which are not present in both phases do not appear in the solubility equation. However, they do affect the solubility through their effect on the activities of the solutes.

Several applications of eqn [37] (all with pressure held constant) will be discussed below. Other cases will be discussed in individual evaluations.

(a) Solubility as a function of temperature.

Consider a binary solid compound  $A_n B$  in a single solvent A. There is

no fundamental thermodynamic distinction between a binary compound of A and B which dissociates completely or partially on melting and a solid mixture of A and B; the binary compound can be regarded as a solid mixture of constant composition. Thus, with c = 2,  $x_A' = n/(n + 1)$ ,  $x_B' = 1/(n + 1)$ , eqn [37] becomes:

$$dln(a_A^n a_B) = -\Delta H_{AB}^{0} d(1/RT)$$
[38]

where

$$\Delta H_{AB}^{0} = nH_{A} + H_{B} - (n+1)H_{S}^{*}$$
<sup>[39]</sup>

is the molar enthalpy of melting and dissociation of pure solid  $A_{n}B$  to form A and B in their reference states. Integration between T and  $T_{u}$ , the melting point of the pure binary compound  $A_{n}B$ , gives:

$$\ln(a_{A}^{n}a_{B}) = \ln(a_{A}^{n}a_{B})_{T=T_{0}} - \int_{T_{0}}^{T} \Delta H_{AB}^{0}d(1/RT)$$
 [40]

(1) Non-electrolytes

In eqn [32], introduce the pure liquids as reference states. Then, using a simple first-order dependence of  $\Delta H_{AB}^*$  on temperature, and assuming that the activitity coefficients conform to those for a simple mixture (6):

$$RT \ln f_A = w x_B^2 \qquad RT \ln f_B = w x_A^2 \qquad [41]$$

then, if w is independent of temperature, eqn [32] and [33] give:

$$\ln\{x_B(1-x_B)^n\} + \ln\left\{\frac{n^n}{(1+n)^{n+1}}\right\} = G(T)$$
 [42]

where

$$G(T) = -\left\{\frac{\Delta H_{AB}^{*} - T^{*} \Delta C_{p}^{*}}{R}\right\} \left\{\frac{1}{T} - \frac{1}{T^{*}}\right\} + \frac{\Delta C_{p}^{*}}{R} \ln(T/T^{*}) - \frac{w}{R} \left\{\frac{x_{A}^{2} + nx_{B}^{2}}{T} - \frac{n}{(n+1)T^{*}}\right\}$$
[43]

where  $\Delta C_p^*$  is the change in molar heat capacity accompanying fusion plus decomposition of the pure compound to pure liquid A and B at temperature  $T^*$ , (assumed here to be independent of temperature and composition), and  $\Delta H_{AB}^*$  is the corresponding change in enthalpy at  $T = T^*$ . Equation [42] has the general form:

$$\ln\{x_B(1-x_B)^n\} = A_1 + A_2/(T/K) + A_3\ln(T/K) + A_4(x_A^2 + nx_B^2)/(T/K)$$
[44]

If the solid contains only component B, then  $n \neq 0$  in eqn [42] to [44].

If the infinite dilution reference state is used, then:

RT 
$$\ln f_{X,B} = w(x_A^2 - 1)$$
 [45]

and [39] becomes

$$\Delta H_{AB}^{m} = nH_{A}^{*} + H_{B}^{m} - (n+1)H_{B}^{*}$$
[46]

where  $\Delta H_{AB}^{\infty}$  is the enthalpy of melting and dissociation of solid compound  $A_{D}B$  to the infinitely dilute reference state of solute B in solvent A;  $H_{A}^{*}$  and  $H_{B}^{\infty}$  are the partial molar enthalpies of the solute and solvent at infinite dilution. Clearly, the integral of eqn [32] will have the same form as eqn [35], with  $\Delta H_{AB}^{\infty}$  replacing  $\Delta H_{AB}^{*}$ ,  $\Delta C_{p}^{\infty}$  replacing  $\Delta Cp^{*}$ , and  $x_{A}^{2}$  - 1 replacing  $x_{A}^{2}$  in the last term.

See (5) and (11) for applications of these equations to experimental data.

(11) Electrolytes

(a) Mole fraction scale

If the liquid phase is an aqueous electrolyte solution, and the solid is a salt hydrate, the above treatment needs slight modification. Using rational mean activity coefficients, eqn [34] becomes:

$$\ln\left\{\frac{\mathbf{x}_{B}^{\nu}(1-\mathbf{x}_{B})^{n}}{(1+(\nu-1)\mathbf{x}_{B})^{n+\nu}}\right\} - \ln\left\{\frac{n^{n}}{(n+\nu)^{n+\nu}}\right\} + \ln\left\{\left[\frac{f_{B}}{f_{B}^{\star}}\right]^{\nu}\left[\frac{f_{A}}{f_{A}^{\star}}\right]^{n}\right\}$$

$$= -\left\{\frac{\Delta H_{AB}^{\star} - T^{\star}\Delta C_{p}^{\star}}{R}\right\}\left\{\frac{1}{T} - \frac{1}{T^{\star}}\right\} + \frac{\Delta Cp^{\star}}{R}\ln(T/T^{\star})$$

$$(47)$$

where superscript \* indicates the pure salt hydrate. If it is assumed that the activity coefficients follow the same temperature dependence as the right-hand side of eqn [47] (13-16), the thermochemical quantities on the right-hand side of eqn [47] are not rigorous thermodynamic enthalpies and heat capacities, but are apparent quantities only. Data on activity coefficients (9) in concentrated solutions indicate that the terms involving these quantities are not negligible, and their dependence on temperature and composition along the solubility-temperature curve is a subject of current research.

A similar equation (with  $\nu = 2$  and without the heat capacity terms or activity coefficients) has been used to fit solubility data for some MOH-H<sub>2</sub>O systems, where M is an alkali metal (13); enthalpy values obtained agreed well with known values. The full equation has been deduced by another method in (14) and applied to MCl<sub>2</sub>-H<sub>2</sub>O systems in (14) and (15). For a summary of the use of equation [47] and similar equations, see (14).

(2) Molality scale

Substitution of the mean activities on the molality scale in eqn [40] gives:

$$\nu \ln \left\{ \frac{\gamma_{\pm} m_{\rm B}}{\gamma_{\pm}^{*} m_{\rm B}^{*}} \right\} - \nu (m_{\rm B}/m_{\rm B}^{*} - 1) - \nu \{m_{\rm B}(\phi - 1)/m_{\rm B}^{*} - \phi^{*} + 1\} = G(T)$$
[48]

where G(T) is the same as in eqn [47],  $m_B^* = 1/nM_A$  is the molality of the anhydrous salt in the pure salt hydrate and  $\gamma_{\pm}$  and  $\phi$  are the mean activity coefficient and the osmotic coefficient, respectively. Use of the osmotic coefficient for the activity of the solvent leads, therefore, to an equation that has a different appearance to [47]; the content is identical. However, while eqn [47] can be used over the whole range of composition ( $0 \le x_B \le 1$ ), the molality in eqn [48] becomes infinite at  $x_B$ = 1; use of eqn [48] is therefore confined to solutions sufficiently dilute that the molality is a useful measure of composition. The essentials of eqn [48] were deduced by Williamson (17); however, the form used here appears first in the Solubility Data Series. For typical applications (where activity and osmotic coefficients are not considered explicitly, so that the enthalpies and heat capacities are apparent values, as explained above), see (18).

The above analysis shows clearly that a rational thermodynamic basis exists for functional representation of solubility-temperature curves in two-component systems, but may be difficult to apply because of lack of experimental or theoretical knowledge of activity coefficients and partial molar enthalpies. Other phenomena which are related ultimately to the stoichiometric activity coefficients and which complicate interpretation include ion pairing, formation of complex ions, and hydrolysis. Similar considerations hold for the variation of solubility with pressure, except that the effects are relatively smaller at the pressures used in many investigations of solubility (5).

(b) Solubility as a function of composition.

At constant temperature and pressure, the chemical potential of a saturating solid phase is constant:

$$\mu_{A_{n}B}^{*} = \mu_{A_{n}B}(sln) = n\mu_{A} + \mu_{B} \qquad [49]$$

$$= (n\mu_{A}^{*} + \nu_{+}\mu_{+}^{\infty} + \nu_{-}\mu_{-}^{\infty}) + nRT lnf_{A}x_{A}$$

$$+ \nu RT ln(\gamma_{\pm}m_{\pm}Q)$$

for a salt hydrate  $A_{n}B$  which dissociates to water (A), and a salt (B), one mole of which ionizes to give  $\nu_{+}$  cations and  $\nu_{-}$  anions in a solution in which other substances (ionized or not) may be present. If the saturated solution is sufficiently dilute,  $f_{A} = x_{A} = 1$ , and the quantity  $K_{B}$  in

$$G^{\infty} = (\nu_{+}\mu_{+}^{\infty} + \nu_{-}\mu_{-}^{\infty} + n\mu_{A}^{*} - \mu_{AB}^{*})$$

 $= -RT \ln K_B$ 

Δ

[50]

r511

 $= -\nu RT \ln(Q\gamma_{\pm}m_B)$ 

is called the solubility product of the salt. (It should be noted that it is not customary to extend this definition to hydrated salts, but there is no reason why they should be excluded.) Values of the solubility product are often given on mole fraction or concentration scales. In dilute solutions, the theoretical behaviour of the activity coefficients as a function of ionic strength is often sufficiently well known that reliable extrapolations to infinite dilution can be made, and values of  $K_{\rm B}$  can be determined. In more concentrated solutions, the same problems with activity coefficients that were outlined in the section on variation of solubility with temperature still occur. If these complications do not arise, the solubility of a hydrate salt  $C_{\rm P}A_{\rm P}\cdot \rm{nH}_{2}O$  in the presence of other solutes is given by eqn [50] as

 $\nu \ln\{m_{\rm B}/m_{\rm B}(0)\} \sim -\nu \ln\{\gamma_{\pm}/\gamma_{\pm}(0)\} - n \ln\{a_{\rm A}/a_{\rm A}(0)\}$ 

where  $a_A$  is the activity of water in the saturated solution,  $m_B$  is the molality of the salt in the saturated solution, and (0) indicates absence of other solutes. Similar considerations hold for non-electrolytes.

Consideration of complex mixed ligand equilibria in the solution phase are also frequently of importance in the interpretation of solubility equilibria. For nomenclature connected with these equilibria (and solubility equilibria as well), see (19, 20).

#### The Solid Phase

The definition of solubility permits the occurrence of a single solid phase which may be a pure anhydrous compound, a salt hydrate, a nonstoichiometric compound, or a solid mixture (or solid solution, or "mixed crystals"), and may be stable or metastable. As well, any number of solid phases consistent with the requirements of the phase rule may be present. Metastable solid phases are of widespread occurrence, and may appear as polymorphic (or allotropic) forms or crystal solvates whose rate of transition to more stable forms is very slow. Surface heterogeneity may also give rise to metastability, either when one solid precipitates on the surface of another, or if the size of the solid particles is sufficiently small that surface effects become important. In either case, the solid is not in stable equilibrium with the solution. See (21) for the modern formulation of the effect of particle size on solubility. The stability of a solid may also be affected by the atmosphere in which the system is equilibrated.

Many of these phenomena require very careful, and often prolonged, equilibration for their investigation and elimination. A very general analytical method, the "wet residues" method of Schreinemakers (22), is often used to investigate the composition of solid phases in equilibrium with salt solutions. This method has been reviewed in (23), where [see also (24)] least-squares methods for evaluating the composition of the solid phase from wet residue data (or initial composition data) and solubilities are described. In principle, the same method can be used with systems of other types. Many other techniques for examination of solids, in particular X-ray, optical, and thermal analysis methods, are used in conjunction with chemical analyses (including the wet residues method).

#### COMPILATIONS AND EVALUATIONS

The formats for the compilations and critical evaluations have been standardized for all volumes. A brief description of the data sheets has been given in the FOREWORD; additional explanation is given below.

#### Guide to the Compilations

The format used for the compilations is, for the most part, selfexplanatory. The details presented below are those which are not found in the FOREWORD or which are not self-evident.

Components. Each component is listed according to IUPAC name, formula, and Chemical Abstracts (CA) Registry Number. The formula is given either in terms of the IUPAC or Hill (25) system and the choice of formula is governed by what is usual for most current users: i.e., IUPAC for inorganic compounds, and Hill system for organic compounds. Components are ordered according to:

(a) saturating components;

(b) non-saturating components in alphanumerical order;

(c) solvents in alphanumerical order.

The saturating components are arranged in order according to a 18-column periodic table with two additional rows: Columns 1 and 2: H, alkali elements, ammonium, alkaline earth elements

- 3 to 12: transition elements
- 13 to 17: boron, carbon, nitrogen groups; chalcogenides, halogens 18: noble gases

  - Row 1: Ce to Lu Row 2: Th to the end of the known elements, in order of atomic number.

Salt hydrates are generally not considered to be saturating components since most solubilities are expressed in terms of the anhydrous salt. The existence of hydrates or solvates is carefully noted in the text, and CA Registry Numbers are given where available, usually in the critical evaluation. Mineralogical names are also quoted, along with their CA Registry Numbers, again usually in the critical evaluation.

Original Measurements. References are abbreviated in the forms given by Chemical Abstracts Service Source Index (CASSI). Names originally in other than Roman alphabets are given as transliterated by Chemical Abstracts.

Experimental Values. Data are reported in the units used in the original publication, with the exception that modern names for units and quantities are used; e.g., mass per cent for weight per cent; mol dm<sup>-3</sup> for molar; etc. Both mass and molar values are given. Usual only one type of value (e.g., mass per cent) is found in the original paper, and the compiler has added the other type of value (e.g., mole Usually. per cent) from computer calculations based on 1983 atomic weights (26).

Errors in calculations and fitting equations in original papers have been noted and corrected, by computer calculations where necessary.

Source and Purity of Materials. Abbreviations used in Method. Chemical Abstracts are often used here to save space.

If these data were omitted by the original authors, Estimated Error. and if relevant information is available, the compilers have attempted to estimate errors from the internal consistency of data and type of apparatus used. Methods used by the compilers for estimating and and reporting errors are based on the papers by Ku and Eisenhart (27).

Comments and/or Additional Data. Many compilations include this section which provides short comments relevant to the general nature of the work or additional experimental and thermodynamic data which are judged by the compiler to be of value to the reader.

References. See the above description for Original Measurements.

Guide to the Evaluations

The evaluator's task is to check whether the compiled data are correct, to assess the reliability and quality of the data, to estimate errors where necessary, and to recommend "best" values. The evaluation takes the form of a summary in which all the data supplied by the compiler have been critically reviewed. A brief description of the evaluation sheets is given below.

Components. See the description for the Compilations.

Evaluator. Name and date up to which the literature was checked.

Critical Evaluation

(a) Critical text. The evaluator produces text evaluating all the published data for each given system. Thus, in this section the evaluator reviews the merits or shortcomings of the various data. Only published data are considered; even published data can be considered only if the experimental data permit an assessment of reliability.

(b) Fitting equations. If the use of a smoothing equation is justifiable the evaluator may provide an equation representing the solubility as a function of the variables reported on all the compilation sheets.

(c) Graphical summary. In addition to (b) above, graphical summaries are often given.

(d) Recommended values. Data are recommended if the results of at least two independent groups are available and they are in good agreement, and if the evaluator has no doubt as to the adequacy and reliability of the applied experimental and computational procedures. Data are considered as tentative if only one set of measurements is

available, or if the evaluator considers some aspect of the computational or experimental method as mildly undesirable but estimates that it should cause only minor errors. Data are considered as doubtful if the evaluator considers some aspect of the computational or experimental method as undesirable but still considers the data to have some value in those instances where the order of magnitude of the solubility is needed. Data determined by an inadequate method or under ill-defined conditions are rejected. However references to these data are included in the evaluation together with a comment by the evaluator as to the reason for their rejection.

(e) References. All pertinent references are given here. References to those data which, by virtue of their poor precision, have been rejected and not compiled are also listed in this section.
(f) Units. While the original data may be reported in the units

used by the investigators, the final recommended values are reported in S.I. units (1, 28) when the data can be accurately converted.

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September, 1986

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- M. Salomon, Fair Haven, New Jersey, U.S.A.

Table I-1 Quantities Used as Measures of Solubility of Solute B Conversion Table for Multicomponent Systems Containing Solvent A and Solutes s molality mass fraction mole fraction concentration  $x_B =$ w<sub>B</sub> = mg = св =  $\frac{M_B x_B}{M_A + \sum\limits_{g} (M_g - M_A) x_g} \qquad \frac{x_B}{M_A (1 - \sum\limits_{g} x_g)} \qquad \frac{\rho x_B}{M_A + \sum\limits_{g} (M_g - M_A) x_g}$ xB хB  $\frac{W_B/M_B}{1/M_A + \sum_{i}(1/M_B - 1/M_A)W_B}$  $\frac{w_B}{M_B(1 - \sum_{s} w_s)}$  $\rho w_B / M_B$ ₩B WB  $\frac{M_B m_B}{1 + \sum_{g} m_g M_g}$ ρm<sub>B</sub> mβ mΒ  $1 + \Sigma M_{s}m_{s}$  $\frac{c_{B}}{\rho - \sum_{a}M_{B}c_{a}}$  $\frac{M_{A}c_{B}}{\sum(M_{A} - M_{S})c_{S}}$ M<sub>B</sub>c<sub>B</sub>/р СВ св

p = density of solution M<sub>A</sub>, M<sub>B</sub>, M<sub>S</sub> = molar masses of solvent, solute B, other solutes s Formulas are given in forms suitable for rapid computation; all calculations should be made using SI base units. xix

COMPONENTS:	EVALUATOR:	
(1) Copper chlorate; Cu(ClO <sub>3</sub> ) <sub>2</sub> ; [14721-21-2]	Hiroshi Miyamoto	
	Niigata University	
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata, Japan	
	July 1987	

#### **CRITICAL EVALUATION:**

There is only one reported publication on  $Cu(ClO_3)_2$ , and this deals with the binary  $Cu(ClO_3)_2$ -H<sub>2</sub>O system (1). Meusser studied this binary system over the temperature range 248-344 K where the solid phases were ice and  $Cu(ClO_3)_2$ ·4H<sub>2</sub>O. The temperature for the ice  $\rightarrow Cu(ClO_3)_2$ ·4H<sub>2</sub>O transition was not given, nor could it be determined by the evaluator since Meusser reported only two data points for the region where ice is the solid phase (see the solubility polytherm on the next page). For the region where the solid phase is  $Cu(ClO_3)_2$ ·4H<sub>2</sub>O, the evaluator fitted the data (the data point for 274.0 K was rejected) to the following smoothing equation:

$$Y_{x} = \frac{-5.7735}{T/K} - 406.5856 \ln(T/K) + 2295.506 + 0.7212596(T/K)$$
[1]

where

$$Y_{x} = ln \left\{ \frac{\chi^{\nu} (1-\chi)^{r} (\nu+r)^{\nu+r}}{r' (1+\chi)^{\nu+r}} \right\}$$
[2]

In eq. [2],  $\chi$  is the mole fraction solubility, r is the mole ratio H<sub>2</sub>O:salt in the solid phase, and v is the number of ions produced upon dissolution (v = 3 for Cu(ClO<sub>3</sub>)<sub>2</sub>). The data point for 274.0 K was rejected because  $\chi_{obsd} - \chi_{calcd}$  exceeded  $2\sigma_x$  where  $\sigma_x$  is the standard error of estimate defined in the usual manner by

$$\sigma_x = \left\langle \frac{\sum (\chi_{obsd} - \chi_{calcd})}{N - Nc} \right\rangle^{1/2}$$
[3]

In eq. [3], N is the number of data points and Nc is the number of constants adjusted in eq. [1]. Similary,  $\sigma_Y$  is the standard error of estimate for the defined quantity  $Y_x$  in eq. [2]. For the present data,  $\sigma_Y = 0.040$  and  $\sigma_x = 0.0056$ ; tentative values of the solubilities in mole fraction and mol kg<sup>-1</sup> units based on eq. [1] are given below for the region where the solid phase is Cu(ClO<sub>3</sub>)<sub>2</sub>·4H<sub>2</sub>O. The polytherm for the entire system reported by Meusser is given on the following page.

Table 1. Tentative Solubilities of Cu(ClO<sub>3</sub>)<sub>2</sub> at Rounded Temperatures From Eq. [1]

	mole fraction	molality
T/K	x	$m_1/mol \ kg^{-1}$
243.2	0.0855	5.26
253.2	0.0958	5.89
263.2	0.1024	6.33
273,2	0.1070	6.65
283.2	0.1104	6.89
293.2	0.1140	7.14
298.2	0.1162	7.30
303.2	0.1188	7.48
313.2	0.1260	8.01
318.2	0.1311	8.38
323.2	0.1375	8.85
333.2	0.1568	10.32
343.2	0.1944	13.51



. 7. .

COMPON				AE ACTIDEMENTC.
COMPONENTS:		ORIGINAL N	ORIGINAL MEASUREMENTS:	
(1) Copper chlorate; Cu(ClO <sub>3</sub> ) <sub>2</sub> ; [14721-21-2]		Meusser, A.	Meusser, A.	
(2) Water;	H <sub>2</sub> O; [7732-18-5	1	Ber. Dtsch.	Chem. Ges. <u>1902</u> , 35, 1414-24.
VARIABI	LES:		PREPARED 1	BY:
T/K = 24	2 - 344		H. Miyamoto	o and E.M. Woolley
EXPERIM	IENTAL VALUES	5:		
solubility of Cu(ClO <sub>3</sub> ) <sub>2</sub>				
	mass %	mol/100 mol H <sub>2</sub> O	mol kg-1	nature of the
t/ºC	(author)	(compilers)	(compilers)	solid phase
-25	39.14	5.03	2.79	ice
-12	30.53	3.44	1.91	ice
	54 50	0.40	5 00	
-31	57.19	9.40	5.22 5.79	$Cu(ClO_3)_2 \cdot 4H_2O$
0.8	58 51	11.02	6.12	17
18	62.17	12.85	7.13	
45	66.17	15.29	8.49	**
59.6	69.42	17.75	9.85	n
71	76.90	26.02	14.45	**
1				
	<u></u>	AUXILIARY	INFORMATION	
METHOD	/APPARATUS/P	ROCEDURE:	SOURCE AN	D PURITY OF MATERIALS:
Cu(ClO <sub>3</sub> ) <sub>2</sub> •4H <sub>2</sub> O and water were placed in a test tube and shaken for one hour. Aliquots of saturated solution were withdrawn with a pipet, and the Cu content determined gravimetrically as Cu <sub>2</sub> S. Analysis of the solid phase gave the following: 76.90 mass % Cu(ClO <sub>3</sub> ) <sub>2</sub> and 23.10 mass % H <sub>2</sub> O. This gives a mole ratio of H <sub>2</sub> O to Cu(ClO <sub>3</sub> ) <sub>2</sub> of 3.84 which is clickly less that the theoretical value of 4.0		Pure Cu(ClO <sub>3</sub> analyzed for ( to a hydrate a	a)2•4H2O was recrystallized. 1.6576 g Cu gave 0.4316 g Cu2S which corresponds about 1 % lower than the tetrahydrate.	
			ESTIMATED	ERROR:
			Nothing speci	fied.
			REFERENCE	 S:

4

#### Copper (II) lodate

COMPONENTS:	EVALUATORS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	H. Miyamoto and E. M. Woolley
	Departments of Chemistry
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata and Brigham Young Universities
	Niigata Japan, and Provo, UT, USA
	July, 1987
CRITICAL EVALUATION:	

#### THE BINARY SYSTEM

Data for the solubility of copper iodate in water have been reported in 13 publications (1-13). All publications are based on chemical analyses of saturated solutions with the exception of the work by Spencer (1) who evaluated the solubility product  $K_{s0}$  based on e.m.f. measurements on cells containing CuSO<sub>4</sub> or KIO<sub>3</sub>. The paper by Vinogradov et al. (12) determined the solubility by analysis of copper (EDTA titration) whereas all other papers determined solubilities by iodometric titration of iodate. The compilers calculated the solubility based on Spencer's calculated  $K_{s0}$ . Although the solubility at 298.2 K reported by Lloyd et al. (4) may be the average of 17 independent determinations, this was not specified in the original publication and we therefore treat this value as a single measurement. Similary, the three publications by Nair et al. (7, 8, 10) all report the same solubility value at 298.2 K, and the evaluators assume that this solubility was only measured once in the first publication (7). Solubilities in multicomponent systems (13-19) will be be considered below.

The extent of hydration of  $Cu(IO_3)_2$  is subject to some uncertainty. The synthetic material prepared by metathesis between copper salts and iodic acid or alkali metal iodates has long been considered to the the monohydrate  $Cu(IO_3)_2$ ·H<sub>2</sub>O (20). In 1940, Berman and Wolfe (21) reported that the naturally occuring mineral bellingerite found in Chuquicamata, Chile was  $3Cu(IO_3)_2$ ·2H<sub>2</sub>O. In 1972 Nassau and Shiever (22) reported that the material usually designated as  $Cu(IO_3)_2$ ·H<sub>2</sub>O was in fact identical to the mineral bellingerite. On the basis of X-ray analysis, Gamsjäger et al. (17) reported that the synthetic material was  $3Cu(IO_3)_2$ ·2H<sub>2</sub>O, but also based on X-ray analysis as well as infrared and thermogravimetric analyses, Vinogradov et al. (12) reported that the synthetic material was the monohydrate. The early work of Spencer (1) reported that "air dried" synthetic copper iodate analyzed as  $Cu(IO_3)_2$ ·0.985H<sub>2</sub>O. Ramette has also published two different versions of this solid material: in (15) Ramette and Broman reported the synthetic material to be the monohydrate whereas in (19), Ramette and Fan reported that heating to  $300^{\circ}$ C "suggested" an original stoichiometry of  $3Cu(IO_3)_2$ ·2H<sub>2</sub>O. At the present time the evaluators do not believe that it possible to specify the exact nature of the solid phase of the stable synthetic copper iodate hydrate: we will however assume it to be the monohydrate.

A summary of the experimental solubility data for the binary system is given in Table 1.

#### Table 1. Experimental solubilities in the binary Cu(IO<sub>3</sub>)<sub>2</sub>-H<sub>2</sub>O system.

T/K	10 <sup>3</sup> c <sub>1</sub> /mol dm <sup>-3</sup>	10 <sup>3</sup> m <sub>1</sub> /mol kg <sup>-1</sup>	reference
293.2	3.21		13
298.2		3.245	3
н	3.26		6
	3.30		5
	3.34		4
+	3.44		13
	3.47		9
*	3.533		7, 8, 10
H	3.58		11
*	3.693ª		2
*	4.2ª		1
303.2	3.65		13
*	3.754		7, 8, 10
308.2	3.956		7,8
313.2	4.101		7,8
318.2	4.633		7,8
n	5.484		10
323.2		5.33	12
*Rejected value	es, see text.		

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(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata and Brigham Young Universities Niigata Japan, and Provo, UT, USA July 1987

#### **CRITICAL EVALUATION:**

The solubility data given in Table 1 were fitted by a relative least squares method to the following empirical equation:

$$ln\left(\frac{10^{3}c_{1}}{\text{mol} \text{dm}^{-3}}\right) = 6409.531 - \frac{169581.8}{T/K} - 1122.868 ln(T/K) + 1.871977(T/K)$$

where  $\sigma = 0.098$ . Based on the standard error of estimate  $\sigma$ , two data points were rejected on the basis that  $c_{obsd} - c_{calcd} > 2\sigma$  (see Table 1). From the smoothing equation, the following recommended and tentative solubilities were calculated for rounded temperatures.

Table 2. Recommended and tentative solubilities of  $Cu(IO_3)_2$  in water

T/K	10 <sup>3</sup> c <sub>1</sub> /mol dm <sup>-3</sup>
293.2	3.19
298.2	3.42*
303.2	3.66
308.2	3.91
313.2	4.21
318.2	4.58
323.2	5.05

\* Recommended value.

#### TERNARY SYSTEMS

Vinogradov et al. (12) were the only investigators to study a three-component system with two saturating components  $(Cu(IO_3)_2-KBrO_3-H_2O)$ . All other studies on ternary systems involve  $Cu(IO_3)_2$  as the only saturating component.

#### Solubility of copper iodate in aqueous solutions of lithium salts.

Fedorov et al. (11) reported solubilities of copper iodate in aqueous solutions of  $LiClO_4$  and  $LiNO_3$  at concentrations up to 4 mol dm<sup>-3</sup>. Their data appear to be somewhat higher than those of other authors who studied  $Cu(IO_3)_2$  solubilities in other salt solutions, and we conclude that there is some unknown source of error, perhaps resulting from an error in the stoichiometry of the iodometric reactions. It is difficult to determine if there are any other possible systematic errors in the experimental method.

Solubility of copper iodate in aqueous solutions of potassium chloride.

There are three independent studies of the solubility of  $Cu(IO_3)_2$  in aqueous KCl solutions at 298.2 K (2, 3, 5), and these results are summarized graphically in Fig. 1. In this figure curve (a) is the extension of curve (b). Keefer's data are based on mol kg<sup>-1</sup> units (curve (d)) whereas all other data are based on mol dm<sup>-3</sup>. The results of Peterson et al. (2) are systematically higher than those of Keefer (3) and Monk (5) by about 12 % and 10 %, respectively. While the source of the error in Peterson's work is difficult to determine, perhaps they too failed to properly account for the stoichiometry of their iodometric titrations. They do state that their analytical results were independent of Cu<sup>++</sup> concentration which is somewhat surprising under their experimental conditions. The more reliable solubility data appear to be those of Keefer and Monk which are designated as Copper (II) lodate

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	Niigata and Brigham Young Universities
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata Japan, and Provo, UT, USA
	July, 1987

#### **CRITICAL EVALUATION:**

tentative solubilities, and the data of Peterson et al. are rejected. A summary of the solubility of  $Cu(IO_3)_2$  in aqueous KCl solutions is given in Table 3 below.

	Table 3. Solubility	of $Cu(IO_3)_2$ in	aqueous KCI solutions a	t 298.2 K.	
KCl concn	$Cu(IO_3)_2$		KCl concn	Cu(IO <sub>3</sub> ) <sub>2</sub>	
mol dm <sup>-3</sup>	mmol dm <sup>-3</sup>	ref	mol kg <sup>-1</sup>	mmol kg <sup>-1</sup>	ref
0.0005	3.724	2	0.0501	3.398	3
0.0010	3.725	2	0.01002	3.517	3
0.0050	3.825	2	0.02005	3.730	3
0.0100	3.992	2	0.03511	3.975	3
0.01309	3.65	5	0.05017	4.166	3
0.02618	3.89	5	0.07529	4.453	3
0.03927	4.10	5	0.1005	4.694	3
0.0500	4.667	2			
0.1000	5.238	2			
0.5000	7.689	2			
1.0000	9.615	2			
2.0000	13.072	2			
3.0000	15.820	2			

Figure 1. Solubility of Cu(IO<sub>3</sub>)<sub>2</sub> in aqueous KCl solutions at 298.2 K



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#### **CRITICAL EVALUATION:**

Solubility in other salt solutions. The solubility of  $Cu(IO_3)_2$  in aqueous salt solutions generally increases as the added salt concentration increases. There are two studies of the solubility of  $Cu(IO_3)_2$  in aqueous sulfate solutions (1, 2), and the results of Spencer should probably be rejected as discussed above. The results of Petersen and Meyers (2) for  $Cu(IO_3)_2$  solubilities in solutions of  $K_2SO_4$ , MgSO<sub>4</sub> or MgCl<sub>2</sub> are designated as tentative. Similarly, the data of Ramette and Fan for the solubility of  $Cu(IO_3)_2$  in aqueous  $Cu(CIO_4)_2$  solutions are designated as tentative values since there are no other publications available for comparisons.

Solubility of Cu(IO<sub>3</sub>)<sub>2</sub> in aqueous acid solutions.

Monk (5) measured the solubility of  $Cu(IO_3)_2$  in aqueous HCl solutions and found that the solubility increases as the HCl concentration increases. This author also determined the ion pair dissociation constant  $K_d$  for CuCl<sup>+</sup>.

Ramette (14) reported the solubility of  $Cu(IO_3)_2$  in 1.00 mol dm<sup>-3</sup> HClO<sub>4</sub>, and although the temperature was not stated, it probably was 298.2 K by comparison with the data for the identical system studied later by Marchall and Blanchard (16). The excellent agreement between these two studies,  $0.0122_5$  mol dm<sup>-3</sup> (14) and 0.01208 mol dm<sup>-3</sup> (16) allows the evaluators to give a recommended solubility for  $Cu(IO_3)_2$  in 1.00 mol dm<sup>-3</sup> HClO<sub>4</sub> solution of  $0.0121_5$  mol dm<sup>-3</sup> with a 95 % confidence interval of  $0.0001_2$  based on the five independent measurements reported by these authors. The solubility of  $Cu(IO_3)_2$  in 1.000 mol dm<sup>-3</sup> HClO<sub>4</sub> solutions at 308.2 K and 323.2 K are designated as tentative solubilities.

Ramette and Broman (15) reported the solubility of  $Cu(IO_3)_2$  in aqueous solutions containing 1.0 x 10<sup>-4</sup> mol dm<sup>-3</sup> HClO<sub>4</sub>, the stated purpose of this small acid concentration being the supression of hydrolysis. Other researchers have not reported complications due to hydrolysis of  $Cu(IO_3)_2$ . For these low acid concentrations, Ramette and Broman computed thermodynamic solubility products for  $Cu(IO_3)_2$  from which they calculated Gibbs energies, enthalpies and entropies.

#### OTHER MULTICOMPONENT SYSTEMS

Solubilities in solutions containing  $HClO_4$  and an alkali metal perchlorate. The data for the solubility of  $Cu(IO_3)_2$  in  $HClO_4$  solutions containing either  $LiClO_4$  or  $NaClO_4$  where the ionic strength is constant at 1.000 mol dm<sup>-3</sup> are summarized in Table 4. Note that we assume that the data of Ramette (14) are for 298.2 K as discussed above. All three studies (14, 16 and 17) found that the solubility data could be fitted to the following equation:

$$Y = 2c_1^{3/2} = a + b[HClO_4]_{total}$$
[1]

In this equation, the constant a is associated with  $(K_{s0})^{1/2}$  and the constant b is associated with  $(K_{s0})^{1/2}/K_a$ where  $K_a$  is the acid dissociation constant (the concentration constant) for HIO<sub>3</sub>. The use of the above equation implies the assumption that activity coefficients do not vary with solution composition at constant ionic strength, but this might not be strictly correct since the solubilities in NaClO<sub>4</sub> are consistently higher then they are in LiClO<sub>4</sub> solutions. Two recommended solubilities at 298.2 K determined by the evaluators from the data are given in Table 4. Finally, it is noted that Gamsjäger et al. (17) computed Gibbs enthalpies and entropies from their  $K_{s0}$  data.

#### Solubilities in solutions containing aliphatic monocarboxylic acids.

Lloyd et al. (4) determined the solubility of  $Cu(IO_3)_2$  at 298.15 K in dilute solutions containing formic, acetic, propanoic, butanoic, 2-methylpropanoic, pentanoic, 3-methylbutanoic, 2,2-dimethylpropanoic, and hexanoic acids, each partially neutralized with NaOH. The enhanced solubilities was accounted for the the following reaction

$$Cu^{**} + RCOO^{-} \Leftrightarrow Cu(RCOO)^{*}$$

[2]

3		Copper	· (II) lodate			
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(2) Water; H <sub>2</sub> O; [7732-1	8-5]		Niigata and Niigata Japa July, 1987	Brigham Youn n, and Provo, 1	g Universities UT, USA	
CRITICAL EVALUATI	ON:					
Table 4. Solubility (ionic str	of Cu(IO <sub>3</sub> ) <sub>2</sub> in 2 ength constant a	H <sub>2</sub> O solutions of t 1.000 mol dm	containing HClO 1 <sup>-3</sup> )ª.	4 and an alkali	metal perchlorate (eq. [1])	
salt	T/K	10 <sup>4</sup> a	103P	$10^4 \sigma_{ m Y}$	ref	
LiClO4	274.2	6.6	1.08		17	
	288.2	7.9	1.56		17	
	298.2	9.1	1.84		16	
	298.2	8.7	1.87	0.08	14	
	298.2	8.9	1.85	0.1	recommended	
	308.2	10.3	2.3		17	
NaClO <sub>4</sub>	298.2	10.8	1.7	0.8	14	
	298.2	9.8	1.7	0.4	16	
	298.2	10.0	1.7	1.0	recommended	
	308.2	12.0	2.3	0.4	16	
	323.2	14.0	2.5	0.2	16	

\* Constants from eq. [1] where a is identified with  $(K_{a0})^{1/2}$  and b is identified with  $(K_{a0})^{1/2}/K_{a}$ . Recommended data determined by the evaluators.

#### Solubility in Phenylethanoic acid.

Lloyd et al. (4) have also measured the solubility of  $Cu(IO_3)_2$  at 298.15 K in dilute aqueous phenylacetic acid, partially neutralized with NaOH. The enhanced solubility was accounted for via eq. [1] above.

#### Solubilities in solutions containing halogen-substituted aliphatic carboxylic acids.

Lloyd et al. (4) reported the solubility of  $Cu(IO_3)_2$  at 298.15 K in dilute aqueous solutions of containing chloroacetic acid, trichloroacetic acid, bromoacetic acid, 2-bromobutanoic acid, and 3-iodopropanoic acid, each partially neutralized with NaOH. The enhanced solubilities was accounted for with eq. [1]. All values reported in (4) are designated as tentative solubilities as they are no other publications available for comparisons.

#### Solubilities in sodium hydroxycarboxylates.

Evans and Monk (6) reported the solubility of  $Cu(IO_3)_2$  in aqueous sodium hydroxyethanoate and in sodium 2-hydroxypropanoate solutions at 298.15 K. Standard state dissociation constants were reported for the two equilibria

$$Cu(X)^* \Leftrightarrow Cu^{**} + X^* \qquad K^0_{d1} \qquad [3]$$

$$Cu(X)_2(aq) \Leftrightarrow Cu^{**} + 2X^- K_{d2}^0$$
 [4]

where X- represents the hydroxycarboxylate ion. Values for the above equilibrium constants are given in the compilations, and all solubility data are designated as tentative values.

#### Solubilities in hydroxy-substituted carboxylic acids.

Data are available for the solubility of  $Cu(IO_3)_2$  in dilute aqueous buffered solutions of NaOH and: DL-2-hydroxypropanoic acid at 298.15 K (4), and at 298.2, 303.2, 313.2 and 318.2 K (7); 2-hydroxyacetic acid at 298.15 K (4) and at 298.2, 303.2, 308.2, 313.2 and 318.2 K (18); and DL-hydroxysuccinic acid at 298.2, 303.2 and 318.2 K (10). Lloyd et al. (4) treated their solubility data in terms of equilibrium [1] as given above.

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#### **CRITICAL EVALUATION:**

Das et al. (10) treated their data for 2-hydroxyacetic acid solutions in a similar manner, but they also calculated enthaply and entropy values for the reverse of reaction [2]. For DL-2-hydroxysuccinic acid solutions, Das et al. (10) also found evidence for the reaction

$$Cu^{**} + "ORCOO" \leftrightarrow Cu(ORCOO)$$
 [5]

In computing Gibbs functions for this equilibrium, Das et al. accounted for activity coefficients and for the formation of the ion pairs  $CuIO_3$ - and  $NaIO_3$ . Ghosh and Nair (7) analyzed their data for DL-2-hydrox-ypropanoic acid solutions in terms of reactions [2] and [6].

$$Cu(RCOO)^* + RCOO^- \Leftrightarrow Cu(RCOO),$$
 [6]

The average values of  $log K_{d^0}$  for the reverse of reaction [2] at 298.2 K for hydroxyacetic acid solutions are -3.05 ( $\sigma = 0.05$ ) from Das et al. (10), and -2.91 ( $\sigma = 0.04$ ) from Lloyd et al. (4). The value from Das et al. is based on seven measurements while the value from Lloyd et al. is based on three measurements. Because the exact [NaOH]/[C<sub>2</sub>H<sub>4</sub>O<sub>3</sub>] ratio is different in these two papers, slightly different expressions were used for the activity coefficient, and becuase slightly different values for ion pairing constants for CuIO<sub>3</sub>- and NaIO<sub>3</sub> were (probably) used, it is not possible to make direct comparisons and suggest recommended or tentative values for these solubility data. Similarly for *DL*-2-hydroxypropanoic acid solutions, it is not possible to compare the two sets of solubility data from (4) and (7). For the reverse of reaction [2] at 298.2 K, Lloyd et al. reported  $log K_{d^0}$ = -2.94 ( $\sigma = 0.06$ ) based on three measurements, and Ghosh and Nair (7) reported  $log K_{d^0} = -2.36$  ( $\sigma = 0.07$ ) based on six measurements. However Ghosh and Nair's value of  $K_{d^0}$  includes the effect of the equilibrium given by reaction [6] above. In view of these difficulties in comparing the solubility data, all results for the solubility of Cu(IO<sub>3</sub>)<sub>2</sub> in hydroxy-substituted carboxylic acid solutions are designated as tentative values.

#### Solubilities in dicarboxylic acids.

Ghosh and Nair (8) reported solubility data for  $Cu(IO_3)_2$  in aqueous mixtures of NaOH with potassium hydrogen phthalate and with malonic acid from 298.2 K to 318.2 K. The increase in the solubility of  $Cu(IO_3)_2$  was attributed to reactions [2] and [6], and thermodynamic equilibrium constants and Gibbs energies were computed. These solubility data are designated as tentative values.

#### Solubilities in amino acid solutions.

Keefer (3) measured the solubility of  $Cu(IO_3)_2$  in aqueous glycine and in aqueous *DL*-alanine solutions, and Monk (5) studied the same systems with additions of either HCl or NaOH. Keefer analyzed his solubility data in terms of the following equilibria

$$HAA + Cu^{**} \Leftrightarrow Cu(AA)^* + H^* \qquad K_1 \qquad [7]$$

$$2HAA + Cu^{**} \Leftrightarrow Cu(AA)_2 + 2H^* \qquad K_2$$
 [8]

$$HAA + Cu^{**} \Leftrightarrow Cu(HAA)^{**} \qquad K_3 \qquad [9]$$

where HAA is the neutral amino acid. Values of these equilibrium constants are given in the compilations, and all solubility data are designated as tentative values. Since Keefer studied three component systems and Monk studied four component systems, direct comparisions of the solubility data are not possible. Monk (5) studied the solubility of  $Cu(IO_3)_2$  at 298.2 K in aqueous glycine, glycylglycine, and *DL*-alanine with either HCl or NaOH, and attributed the observed increase in solubility to the equilibria given in reactions [2] and [6]. The dissociation constants for these equilibria are given in the compilations, and all of Monk's solubility data are designated as tentative values. 10

#### Copper (II) lodate

COMPONENTS:	EVALUATORS:	
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CRITICAL EVALUATION:		

Solubilities in mixtures of water and an organic solvent.

Miyamoto (9) and Miyamoto, Yamamoto and Maruyama (13) reported the solubility of  $Cu(IO_3)_2$  in tetrahydrofuran-water and N,N-dimethylformamide-water mixtures. In both systems, the logarithm of the the  $Cu(IO_3)_2$  solubility decreases almost linearly with the reciprocal of the dielectric constant of the solvent. These solubilities are designated as tentative.

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COMPONENTS:	EVALUATORS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	H. Miyamoto Niigata University
(2) Deuterium oxide (water-d <sub>2</sub> ); D <sub>2</sub> O; [7789-20-0]	Niigata, Japan August, 1987

#### **CRITICAL EVALUATION:**

Solubility data for  $Cu(IO_3)_2$  in deuterium oxide have been reported in two publications (1, 2). Ramette and Broman (1) reported the solubility of  $Cu(IO_3)_2$  in 99.5 %  $D_2O$  containing 1 x 10<sup>-4</sup> mol dm<sup>-3</sup> HClO<sub>4</sub> and LiClO<sub>4</sub> from 0 to .100 mol dm<sup>-3</sup>. Using the Debye-Hückel extended equation, these authors computed thermodynamic solubility products for the three experimental temperatures of 287.9 K, 298.2 K, and 308.2 K. These solubility products were used in the calculations of Gibbs energies.

Gamsjäger et al. (2) measured the solubility of  $Cu(IO_3)_2$  in 99.8+ %  $D_2O$  containing  $DCIO_4$  and  $LiCIO_4$  over the temperature range of 274.2 K to 308.2 K.  $DCIO_4$  and  $LiCIO_4$  were used to maintain a constant ionic strength of 1 mol kg<sup>-1</sup>. The solubility data were reported graphically, and only concentration solubility products were given. The compilers used these  $K_{s0}$  values and equation [1] above to compute the solubilities.

All solubility data in (1) and (2) are designated as tentative values.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper lodate; $Cu(10_3)_2$ ; [15454-89-2]	Monk, C.B.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Trans. Faraday Soc. <u>1951</u> , 47, 285-91.
VARIABLES:	PREPARED BY:
T/K = 298	E.M. Woolley and H. Miyamoto
EXPERIMENTAL DATA:	L
The solubility of $Cu(IO_3)_2$ in pure water at 25°C was given by	ven as:
batch solubility mol dm <sup>-3</sup>	log K <sub>s0</sub> ª K <sub>s0</sub> b mol <sup>3</sup> dm <sup>-9</sup>
1 0.00330	-7.1325 7.37 x 10-7
2 0.00333 3 0.00337¢	-7.1311b 7.39 x 10-7
*K <sub>s0</sub> was calculated by the authors from	
log K <sub>s0</sub> = [Cu <sup>2+</sup> ][IO <sub>3</sub> -] <sup>2</sup> - 3[I <sup>1/2</sup>	$2/(1 + 1^{1/2}) - 0.2I]$
where I is the ionic strength and where formation of the using the following values for the ion pair dissociation of Activity coefficients were estimated from the equation	species $CuIO_3^+$ and $HIO_3$ is taken into account by constants: $K_d(CuIO_3^+) = 0.15$ and $K_d(HIO_3) = 0.165$ .
$\log y_{z} = -(z^{2}/2)[I^{1/2}/(1 + I^{1})]$	/2) - 0.2]]
where z is the ionic charge of the species.	
<sup>b</sup> Calculated by the compilers.	
cThis third solubility value is asserted to be suspect by t	the authors.
AUXILIARY I	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Saturating column method was used, and details are given in ref. (1). The solvent was allowed to flow through the saturator sufficiently slowly for equilibri- um to be established. The saturated solutions were made acidic with dilute acetic acid, and a large excess of solid KI was added. The resulting mixture was titrated to determine iodate content with $Na_2S_2O_3$ solution that had been standardized with Analytical Reagent KIO <sub>3</sub> .	Cu(IO <sub>3</sub> ) <sub>2</sub> crystals were prepared by allowing dilute solutions of analytical grade CuSO <sub>4</sub> and KIO <sub>3</sub> to drop slowly into a large volume of hot water. The very fine crystals were washed out insofar as possible. ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K. REFERENCES: (1) Wise, W.C.A.; Davies, C.W. J. Chem. Soc. <u>1938</u> , 273.

COMPONENTS:	ORIGINAL MEASUREMENTS
(1) Copper iodate: $Cu(IO_2)_2$ : [13454-89-2]	Llovd, M.: Wycherley, V.: Monk, C.B.
(2) Water; H <sub>2</sub> O; [7732-18-5]	J. Chem. Soc. <u>1951</u> , 1786-9.
VARIABLES:	PREPARED BY:
T/K = 298	E.M. Woolley and H. Miyamoto
EXPERIMENTAL DATA:	I
The solubility of $Cu(IO_3)_2$ in pure water at 25°C was given by	ven as:
solubility solubil	ity solubility
mol dm-8 mol d	$m^{-3}$ mol dm $-3$
0.00333 0.003	0.00333
0.00336 0.0033	33 0.00333
0.00333 0.003	0.00333
0.00336 0.003	36 0.00333
0.00333 0.003	34 0.00333
0.00334 0.003	33
thermodynamic solubility product from $log K_{s0} = [Cu^{2+}][IO_{3}-]^{2} - 3log (AI1/2)$ where I is the ionic strength. At zero ionic strength the 10-8 mol <sup>3</sup> dm <sup>-9</sup> ). aIn the original paper, the Debye-Huckel constant A wa	A authors reported $log K_{s0} = -7.1210$ (i.e. $K_{s0} = 7.57 \times 100$ m this equation.
AUXILIARY I	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Saturating column method used as in (1) and modified in (2). A bulb containing the solvent solution was attached to a column containing $Cu(IO_3)_2$ , and the solution allowed to flow through the column at a rate sufficient to insure saturation (1). The modification (2) was to connect the column to a second parallel arm in which the saturated solution was collected. The entire apparatus was thermostated. A portion of the saturated solution was run through the saturating column a second time. The iodate concentrations of the saturat- ed solutions were determined volumetrically by using $Na_2S_2O_3$ solution previously standardized with KIO <sub>3</sub> .	$Cu(IO_3)_2$ crystals were prepared by allowing concentrated solutions of $CuSO_4$ and $KIO_3$ to drip slowly into nearly boiling water. The product was ground and the "fines" washed out.
	ESTIMATED ERROR: Soly: nothing specified.
	REFERENCES: (1) Bronsted, N.J.; La Mer, V.K. J. Am. Chem. Soc. <u>1924</u> , 46, 555. (2) Money, R.W.; Davies, C.W. J. Chem. Soc. <u>1934</u> , 400.

COMPONENTS:		ORIGINAL MEAS	SUREMENTS:
(1) Copper iodate; C	Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Fedorov, V.A.; R	obov, A.M.; Shmyd'ko, I.I.; Koneva
(2) Lithium nitrate;	LiNO <sub>3</sub> ; [7790-69-4]	T.N. Simaeva, L.S	.; Kukhtina, V.A.
OF (2) Lithium norohlo:	roto: I (CIO + (7701-02-0)	7h Fin Khim 10	76 80 2212 5. Durg I Bhys
(3) Water; $H_2O$ ; [77]	32-18-5]	Chem. (Engl. Tra	nsl.) <u>1976</u> , 50, 1300-2.
VARIABLES:		PREPARED BY:	
Concentration of Li T/K = 298	NO3 or LiClO4	H. Miyamoto	
EXPERIMENTAL V	ALUES:	I	
LiNO <sub>3</sub> concn	$Cu(IO_3)_2$ solubility	LiClO <sub>4</sub> concn	Cu(IO <sub>3</sub> ) <sub>2</sub> solubility
mol dm <sup>-3</sup>	mol dm <sup>-3</sup>	mol dm <sup>-3</sup>	mol dm <sup>-3</sup>
	0.00050	٥	0.00358
0	0.00358	v	
0 0.01	0.00358	0.01	0.00400
0 0.01 0.05	0.00358 0.00400 0.00458	0.01 0.05	0.00400 0.00454
0 0.01 0.05 0.10	0.00358 0.00400 0.00458 0.00492	0.01 0.05 0.10	0.00400 0.00454 0.00485
0 0.01 0.05 0.10 0.25	0.00358 0.00400 0.00458 0.00492 0.00495	0.01 0.05 0.10 0.25	0.00400 0.00454 0.00485 0.00547
0 0.01 0.05 0.10 0.25 0.40	0.00358 0.00400 0.00458 0.00492 0.00495 0.00645	0.01 0.05 0.10 0.25 0.40	0.00400 0.00454 0.00485 0.00547 0.00575
0 0.01 0.05 0.10 0.25 0.40 0.50	0.00358 0.00400 0.00458 0.00492 0.00495 0.00645 0.00666	0.01 0.05 0.10 0.25 0.40 0.50	0.00400 0.00454 0.00485 0.00547 0.00575 0.00585
0 0.01 0.05 0.10 0.25 0.40 0.50 1.00	0.00358 0.00400 0.00458 0.00492 0.00495 0.00645 0.00666 0.00745	0.01 0.05 0.10 0.25 0.40 0.50 1.00	0.00400 0.00454 0.00485 0.00547 0.00575 0.00585 0.00580
0 0.01 0.05 0.10 0.25 0.40 0.50 1.00 2.00	0.00338 0.00400 0.00458 0.00492 0.00495 0.00645 0.00666 0.00745 0.00830	0.01 0.05 0.10 0.25 0.40 0.50 1.00 2.00	0.00400 0.00454 0.00485 0.00547 0.00575 0.00585 0.00580 0.00530
0 0.01 0.05 0.10 0.25 0.40 0.50 1.00 2.00 3.00	0.00338 0.00400 0.00458 0.00492 0.00495 0.00645 0.00666 0.00745 0.00830 0.00854	0.01 0.05 0.10 0.25 0.40 0.50 1.00 2.00 3.00	0.00400 0.00454 0.00485 0.00547 0.00575 0.00585 0.00580 0.00530 0.00440

-7.06.

### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The experimental method used was similar to that described in (1). Equilibrium required 4-6 hours, and the solubilities were determined by iodometric titration with amperometric end point detection.	The source and purities of materials were not given. The authors state that the solid phase is $Cu(IO_3)_2 \cdot H_2O$ .
Each solubility value given in the data table above is the mean of 3-4 determinations.	
	ESTIMATED ERROR:
	Soly: reproducibility within 2-3 %. Temp: nothing specified.
	REFERENCES:
	(1) Fedorov, V.A.; Shmyl'ko, I.I.; Robov, A.M.; Shi- maeva, L.S.; Kukhtina, V.A.; Mironov, V.E. Zh. Neorg. Khim. <u>1973</u> , 18, 1274.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Peterson, B.H.; Meyers, E.L.
(2) Potassium chloride; KCl; [7447-40-7]	J. Am. Chem. Soc. <u>1930</u> , 52, 4853-7. Proc. Iowa Acad. Sci. <u>1930</u> , 37, 223-4.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Concentration of KCl $T/K \approx 298$	H. Miyamoto and E.M. Woolley
EXPERIMENTAL DATA:	
The solubility of $Cu(IO_3)_2$ in aqueous KCl solutio	ns at 25°C was given as:

ionic strength	KCl concn <sup>a</sup>	solubility
mol dm-3	mol dm-3	mol dm-3
0.01108	0.0	0.003693ь
0.01167	0.0005	0.003724
0.01217	0.0010	0.003725
0.01647	0.0050	0.003825
0.02198	0.0100	0.003992
0.06400	0.0500	0.004667
0.11571	0.1000	0.005238
0.52306	0.5000	0.007689
1.02884	1.0000	0.009615
2.03922	2.0000	0.013072
3.04746	3.0000	0.015820

<sup>a</sup>Calculated by the compilers from [KCl] = (ionic strength) - 3(solubility). <sup>b</sup>Compilers calculate  $K_{s0} \approx 2.0 \times 10^{-7} \text{ mol}^3 \text{ dm}^{-9}$  from this data point.

AUXILIARY I	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
<sup>5</sup> g Cu( $IO_3$ ) <sub>2</sub> ·H <sub>2</sub> O were added to 250 cm <sup>3</sup> of KCl solution in Pyrex Erlenmeyer flasks fitted with stoppers through which a stirring rod extended. The flasks were thermostatted and gently agitated for 5 d, and then allowed to stand for 12 h. Solutions were analyzed for $IO_3$ - by addition of KI and H <sub>2</sub> SO <sub>4</sub> followed by titration with 0.05 mol dm <sup>-3</sup> Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> which was previously standardized with standard KIO <sub>3</sub> solution. Reproducibility in the presence of varying amounts of Cu <sup>2+</sup> was within 0.1 %.	Cu( $IO_3$ ) <sub>2</sub> ·H <sub>2</sub> O prepared from purified CuSO <sub>4</sub> and KIO <sub>3</sub> solutions by dropwise addition into a large volume of doubly distilled water kept at 60°C and constantly stirred. The ppt was washed several times by decantation, and was sedimented in a tall cylinder: all particles that did not settle were siphoned off. The ppt was then filtered and dried over CaCl <sub>2</sub> , and analyzed. KCl was recrystallized and dried.
	ESTIMATED ERROR: Soly: precision ± 0.1 %. Temp: precision ± 0.02 K.
	REFERENCES:

COMPONENTS:	ORIGINAL	MEASUREMENTS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2	2] Keefer, R.M	1.
(2) Potassium chloride; KCl; [7447-40-7]	J. Am. Che	m. Soc. <u>1948,</u> 70, 476-9.
(3) Water; H <sub>2</sub> O; [7732-18-5]		
VARIABLES:	PREPARED	BY:
Concentration of KCl T/K = 298	H. Miyamot	to
EXPERIMENTAL DATA:		
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous	KCl solutions at 25°C was g	iven as:
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn	s KCl solutions at 25°C was g solubility	iven as: solubility
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn	s KCl solutions at 25°C was g solubility (experimental)	iven as: solubility (calculated)
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup>	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup>	iven as: solubility (calculated) mol kg <sup>-1</sup>
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245	iven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501	s KCl solutions at 25°C was g solubility (experimental) mol kg-1 0.003245 0.003398	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501 0.01002	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245 0.003398 0.003517	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396 0.003521
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501 0.01002 0.02005	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245 0.003398 0.003517 0.003730	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396 0.003521 0.003730
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501 0.01002 0.02005 0.03511	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245 0.003398 0.003517 0.003730 0.003975	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396 0.003521 0.003730 0.003969
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501 0.01002 0.02005 0.03511 0.05017	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245 0.003398 0.003517 0.003730 0.003975 0.004166	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396 0.003521 0.003730 0.003969 0.004166
EXPERIMENTAL DATA: The solubility (S) of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous KCl concn mol kg <sup>-1</sup> 0.0 0.00501 0.01002 0.02005 0.03511 0.05017 0.07529	s KCl solutions at 25°C was g solubility (experimental) mol kg <sup>-1</sup> 0.003245 0.003398 0.003517 0.003730 0.003975 0.004166 0.004453	viven as: solubility (calculated) mol kg <sup>-1</sup> 0.003243 0.003396 0.003521 0.003730 0.003969 0.004166 0.004454

where I is the ionic strength, [KCl] + 3(S). From the experimental solubility in pure water the compiler calculates  $K_{s0} = 1.36 \times 10^{-7} \text{ mol}^3 \text{ kg}^{-3}$ , and from the above equation the compiler calculates  $K_{s0} = 7.32 \times 10^{-8}$ mol<sup>3</sup> kg-3.

AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Method as in (1). KCl solutions prepared from distilled water using calibrated volumetric apparatus. Excess air-dried copper iodate placed in glass-stopperd Pyrex flasks and the KCl solutions added. The flasks were placed in a thermostat at $25^{\circ}$ C and rotated for at least 12 h. By applying pressure, samples of saturated solution were removed with a pipet fitted with an asbestos filter. Solubilities were determined by iodo- metric titration modified for the presence of Cu <sup>2+</sup> using the method of Foote and Vance (2).	Cu( $IO_3$ ) <sub>2</sub> prepared by adding equal volumes of 0.2 mol kg <sup>-1</sup> KIO <sub>3</sub> and 0.1 mol kg <sup>-1</sup> CuSO <sub>4</sub> solutions to a large volume of water at 60°C. The ppt was filtered and stored under water overnight. The product was sedimented several times and the smaller particles were discarded. After drying for 2 h at 250-270°C, the dried copper iodate was analyzed iodometrically and the purity was reported as 100.1 %.
	ESTIMATED ERROR: Soly: duplicates agreed to $\pm$ 0.2 %. Temp: precision $\pm$ 0.02 K.
	REFERENCES: (1) Keefer, R.M.; Reiber, H.G.; Bisson, C.S. J. Am. Chem. Soc. <u>1940</u> , 62, 2951. (2) Foote, H.W.; Vance, J.E. Ind. Eng. Chem. Anal. Ed. <u>1936</u> , <b>8</b> , 119.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Copper jodate: $Cu(IO_{\bullet})_{\bullet}$ : [13454-89-2]	Monk, C.B.	
(2) Potassium chloride: $K(1)$ [7447-40-7]		
	Trans Foradov Soc 1951 47 285-91	
(2)  Hudroop ablacida: HCb (7647, 01, 0)	Trans. Faladay Soc. <u>1221</u> , 47, 203-51.	
(2) Weters II O: (7722) 18 51		
$[(3) \text{ water; } H_2O; [7/32-18-5]$		
VARIABLES:	PREPARED BY:	
Concentration of KCl or HCl	1	
T/K = 298	E.M. Woolley and H. Miyamoto	
EXPERIMENTAL DATA:		
The solubility of $Cu(IO_3)_2$ in aqueous KCl or HCl solut	ion at 25°C was given as:	
KCl or HCl concn solut	bility K <sub>d</sub> (CuCl+) <sup>a</sup>	
mol dm-3 mol	dm <sup>-3</sup> mol dm <sup>-3</sup>	
(KCl) 0.0 0.00		
" 0.01309 0.00	0.31	
" 0.02618 0.00	0.43	
" 0.03927 0.00	0.35	
(HCI) 0.03906 0.00	0.53	
" 0.08139 0.00	0.37	
<sup>a</sup> The dissociation constant for CuCl+ was calculated usi	ng the following literature values for dissociation	
constants of other ion pair species: $K_d(HIO_3) = 0.165$ , H	$L_d(KIO_3) = 2.0$ . For CuIO <sub>3</sub> +, the dissociation constant	
was estimated as 0.15.		
Activity coefficients were estimated from the equation		
$\log y_{z} = -(z^{2}/2)[I^{1/2}/(1 + I^{1/2}) - 0.2I]$		
where I is the ionic strength and z is the ionic charge of missing from this equation.	f the species. Note that the Debye-Huckel A constant is	
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Saturating column method was used, and details are	Cu(IO <sub>3</sub> ) <sub>2</sub> crystals were prepared by allowing dilute	
given in ref. (1). The solvent was allowed to flow	solutions of analytical grade CuSO <sub>4</sub> and KIO <sub>3</sub> to drop	
through the saturator sufficiently slowly for equilibri-	slowly into a large volume of hot water. The very fine	
um to be established. The saturated solutions were	crystals were washed out insofar as possible.	
made acidic with dilute acetic acid, and a large excess		
of solid KI was added. The resulting mixture was		
titrated to determine iodate content with $Na_2S_2O_3$		
solution that had been standardized with Analytical		
Reagent KIO <sub>3</sub> .		
	ESTIMATED ERROR:	
	Soly: nothing specified.	
	Temp: precision ± 0.02 K.	
	REFERENCES:	
	(1) Wise, W.C.A.; Davies, C.W. J. Chem. Soc. <u>1938</u> ,	
	273.	
# Copper (II) Iodate

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	ORIGINAL MEASUREMENTS: Vinogradov, E.E.; Karataeva, I.M.; Lepeshkov, I.N.	
(2) Potassium iodate; KIO <sub>3</sub> ; [7758-05-6]	Zh. Neorg. Khim. <u>1979</u> , 24, 1375-7: Russ. J. Inorg.	
(3) Water; H <sub>2</sub> O; [7732-18-5]	Chem, (Engl Transi.) <u>1772</u> , 24, 702-4.	
VARIABLES: Composition T/K = 323	PREPARED BY: H. Miyamoto and E.M. Woolley	
EXPERIMENTAL DATA:		

D. composition	a	Cu(l	(O <sub>2</sub> ), composition	nB	nature of the solid phaseb
mol kg-1	mol %	mass %	104mol kg-1	mole %	
0.623	1.109				Α
0.508	0.907	0.007	1.9	0.00034	A + C
0.500	0.892	0.015	4.0	0.00072	A + C
0.476	0.850	0.025	6.7	0.00119	с
0.384	0.687	0.030	7.9	0.00141	С
0.272	0.488	0.055	14.1	0.00253	С
0.208	0.373	0.013	3.3	0.00059	С
0.149	0.269	0.015	3.7	0.00067	С
0.132	0.237	0.019	4.7	0.00085	B + C
0.113	0.203	0.012	3.0	0.00053	B + C
0.053	0.095	0.020	4.9	0.00088	В
		0.220	53.3	0.00961	В
	D3 composition mol kg <sup>-1</sup> 0.623 0.508 0.500 0.476 0.384 0.272 0.208 0.149 0.132 0.113 0.053	D3 composition* mol kg-1         mol %           0.623         1.109           0.508         0.907           0.500         0.892           0.476         0.850           0.384         0.687           0.272         0.488           0.208         0.373           0.149         0.269           0.132         0.237           0.113         0.203           0.053         0.095	D3 composition* mol kg-1         Cu(1) mol %g-1           0.623         1.109           0.508         0.907           0.508         0.907           0.500         0.892           0.15           0.476         0.850           0.272         0.488           0.208         0.373           0.149         0.269           0.132         0.237           0.113         0.203           0.053         0.095           0.020	$O_3$ composition <sup>a</sup> mol kg <sup>-1</sup> Cu(IO_3)_2 composition mass %         Cu(IO_3)_2 composition 1.9         Cu(IO_3)_2 composition (0.012         Cu(IO_3)_2 composition (0.012         Cu(IO_3)_2 composition (0.020         Cu(IO_3)_2 composition (0.020 <thcu(io_3)_2 composition<br="">(0.020         <thcu(i< td=""><td><math>O_3 \text{ composition}^{a}</math> mol kg<sup>-1</sup>         mol %         <math>Cu(IO_3)_2 \text{ composition}^{a}</math> mass %         mol kg<sup>-1</sup>         mol %           0.623         1.109              0.508         0.907         0.007         1.9         0.00034           0.500         0.892         0.015         4.0         0.00072           0.476         0.850         0.025         6.7         0.00119           0.384         0.687         0.030         7.9         0.00141           0.272         0.488         0.055         14.1         0.00253           0.208         0.373         0.013         3.3         0.00059           0.149         0.269         0.015         3.7         0.00085           0.113         0.203         0.012         3.0         0.00053           0.053         0.095         0.020         4.9         0.00088             0.220         53.3         0.00961</td></thcu(i<></thcu(io_3)_2>	$O_3 \text{ composition}^{a}$ mol kg <sup>-1</sup> mol % $Cu(IO_3)_2 \text{ composition}^{a}$ mass %         mol kg <sup>-1</sup> mol %           0.623         1.109              0.508         0.907         0.007         1.9         0.00034           0.500         0.892         0.015         4.0         0.00072           0.476         0.850         0.025         6.7         0.00119           0.384         0.687         0.030         7.9         0.00141           0.272         0.488         0.055         14.1         0.00253           0.208         0.373         0.013         3.3         0.00059           0.149         0.269         0.015         3.7         0.00085           0.113         0.203         0.012         3.0         0.00053           0.053         0.095         0.020         4.9         0.00088             0.220         53.3         0.00961

"Molalities and mol % solubilities calculated by the compilers.

<sup>b</sup> A = KIO<sub>3</sub> ; B = Cu(IO<sub>3</sub>)<sub>2</sub>·H<sub>2</sub>O ; C = 2KIO<sub>3</sub>·Cu(IO<sub>3</sub>)<sub>2</sub>·2H<sub>2</sub>O.

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method. Equilibrium reached in about one month. The copper content of the saturated solutions was determined by EDTA titration in strong alkaline medium using methyl thymol blue indicator. Potassium was determined gravimetrically by pptn with sodium tetraphenylborate. The solid phases were investigated by thermogravimetry, X-ray diffraction, and infrared methods.	Copper iodate prepared from copper sulfate and iodic acid. The purity was checked by chemical and X-ray diffraction analysis. The extent of hydration was not given. C.p. grade KIO <sub>3</sub> was used.
COMMENTS AND/OR ADDITIONAL DATA:	ESTIMATED ERROR:
Using the activity coefficient relationship	Nothing specified.
log $y_{\pm} = -(z^2/2)I^{1/2}/(1 + I^{1/2})$ the compilers calculated thermodynamic solubility products. For the last data point in the above table, $K_{s0} = 4.4 \times 10^{-7} \text{ mol}^3 \text{ kg}^{-3}$ , and for the next to last data point, $K_{s0} = 3.9 \times 10^{-7} \text{ mol}^3 \text{ kg}^{-3}$ .	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]		Peterson, B.H.; Meyers, E.L.	
(2) Potassium sulfate; K <sub>2</sub> SO <sub>4</sub> ; [7778-80-5]		J. Am. Chem. Soc. <u>1930</u> , 52, 4853-7.	
		Proc. Iowa Acad. Sci. 1930, 37, 223-4.	
(3) Water: H <sub>2</sub> O: [7732-18-5]			
VARIABLES:		PREPARED BY:	
Concentration of K <sub>2</sub> SO <sub>4</sub>			
1/K = 298		H. Miyamoto and E.M. Woolley	
EXPERIMENTAL DATA:			
The solubility of $Cu(IO_{2})$ , in squeous K SO, solution	ons at	at 250C was given as	
		, , , , , , , , , , , , , , , , , , ,	
ionic strength K <sub>2</sub> S	SO₄ co	concn <sup>a</sup> solubility	
-	-	-	
moldm <sup>-3</sup> m	iol dm	m <sup>-3</sup> mol dm <sup>-3</sup>	
0.01109	<b>.</b>	0.003603b	
0.01108	J.U 	0.003095	
0.01285	0.0005	50 0.003785	
0.01465 0	0.0010	00 0.003882	
0.02808 0	0.0050	00 0.004359	
0.04457 0	0.0100	00 0.004856	
0.17052 0	0.0500	00 0.006840	
0.30248	0025	55 0.0000700	
1.54502	5.0723	0.000275	
1.54503	1.5000	00 0.015010	
<sup>a</sup> Calculated by the compilers from $[K_2SO_4] = \{(ion$	ic stre	rength) - 3(solubility))/3.	
<sup>b</sup> Compilers calculate K $a = 2.0 \times 10^{-7}$ mol <sup>3</sup> dm <sup>-9</sup> f	rom t	this data point	
Complete valuation $\mathbf{x}_{00} = 2.0 \times 10^{-1}$ into a finite tribulation point.			
According to the authors, this value seems to be t	too 10	ow.	
AUXILIA	RY IN	INFORMATION	
METHOD/APPAPATUS/PROCEDURE		SOURCE AND PUBITY OF MATERIALS	
METHOD/AFFARATUS/FROCEDURE;	ļ	SOURCE AND FORTH OF MATERIALS.	
S & Cutto ) II O many added to 250 am <sup>8</sup> of K SO	1	Cu(IO), H.O. managed from munified CuSO, and KIO.	
$^{5}$ g Cu(IO <sub>3</sub> ) <sub>2</sub> •H <sub>2</sub> O were added to 250 cm <sup>3</sup> of K <sub>2</sub> SO <sub>4</sub>	4	Cu(103)2•H2O prepared from purified CuSO4 and KIO3	
solution in Pyrex Erlenmeyer flasks fitted with stor	ppers	solutions by dropwise addition into a large volume of	
hrough which a stirring rod extended. The flasks		doubly distilled water kept at 60°C and constantly	
were thermostatted and gently agitated for 5 d. and		stirred. The ppt was washed several times by decanta-	
then allowed to stand for 12 h. Solutions were	(	tion, and was sedimented in a tall cylinder; all particles	
analyzed for IO by addition of KI and H-SO.		that did not settle were sinhoned off. The not was	
followed hus the time bit 0.05 and dues he 5.0	1	then filtered and dried over Grain and enclured	
ronowed by titration with 0.05 mol dm <sup>-5</sup> Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>		then intered and dried over CaCl <sub>2</sub> , and analyzed.	
which was previously standardized with standard K	$10_3$		
solution. Reproducibility in the presence of varyin	ig	$K_2SO_4$ was recrystallized and dried.	
amounts of Cu <sup>2+</sup> was within 0.1 %.			
	ł	ESTIMATED EDDOC	
	)	ESTIMATED ERROR:	
		Soly: precision $\pm 0.1$ %.	
	ĺ	$1 \text{ emp: precision } \pm 0.02 \text{ K.}$	
	4		
	Í	REFERENCES:	
	Í		
	1		

20	Copper (I	I) lodate		
COMPONENTS:		ORIGINAL	MEASUREMENTS:	
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]		Peterson, B	H.; Meyers, E.L.	
(2) Magnesium chloride; MgCl <sub>2</sub> ; [7786-30-3]		J. Am. Che	m. Soc. <u>1930</u> , 52, 4853-7.	
(3) Water; H <sub>2</sub> O; [7732-18-5]	(3) Water; H <sub>2</sub> O; [7732-18-5]		Proc. Iowa Acad. Sci. <u>1930</u> , 37, 223-4.	
VARIABLES: Concentration of MgCla		PREPARED	BY:	
T/K = 298		H. Miyamoto and E.M. Woolley		
EXPERIMENTAL DATA:				
The solubility of $Cu(IO_3)_2$ in aqueous $MgCl_2$	solutions at	25°C was gi	ven as:	
ionic strength	MgCl <sub>2</sub> co	oncna	solubility	
mol dm-3	mol di	m-3	mol dm- <sup>3</sup>	
0.01108	0.0		0.002/025	
0.01783	0.0	۲	0.0030935	
0.01285	0.000	0	0.003775	
0.02775	0.001	1	0.003821	
0.02775	0.0051		0.004451	
0.16933	0.010	7	0.005742	
0 32354	0.0507		0.006446	
1.46577	0.101	7	0.008440	
3 11027	0.4767		0.011658	
4.38494	1.025		0.013946	
<sup>a</sup> Calculated by the compilers from [MgCl <sub>2</sub> ] <sup>b</sup> Compilers calculate $K_{s0} = 2.0 \times 10^{-7} \text{ mol}^3$ <sup>c</sup> This value seems to be unusally low (comp.	= {(ionic str dm <sup>-9</sup> from ( ilers).	ength) - 3(so his data poin	lubility)}/3. t.	
AU	XILIARY I	NFORMATIC	DN	
METHOD/APPARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERIALS:	
5 g Cu(IO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O were added to 250 cm <sup>3</sup> of MgCl <sub>2</sub> solution in Pyrex Erlenmeyer flasks fitted with stoppers through which a stirring rod extended. The flasks were thermostatted and gently agitated for 5 d, and then allowed to stand for 12 h. Solutions were analyzed for IO <sub>3</sub> - by addition of KI and H <sub>2</sub> SO <sub>4</sub> followed by titration with 0.05 mol dm <sup>-3</sup> Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> which was previously standardized with standard KIO <sub>3</sub> solution. Reproducibility in the presence of varying amounts of Cu <sup>2+</sup> was within 0.1 %.		Cu(IO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O prepared from purified CuSO <sub>4</sub> and KIO <sub>3</sub> solutions by dropwise addition into a large volume of doubly distilled water kept at $60^{\circ}$ C and constantly stirred. The ppt was washed several times by decanta- tion, and was sedimented in a tall cylinder: all particles that did not settle were siphoned off. The ppt was then filtered and dried over CaCl <sub>2</sub> , and analyzed. MgCl <sub>2</sub> was recrystallized and dried.		
		ESTIMATE Soly: precisi Temp: preci	D ERROR: on ± 0.1 %. sion ± 0.02 K.	
		REFERENC	ES:	

COMPONENTS:	10	ORIGINAL MEASUREMENTS:	
(1) Conner iodate: Cu(IO <sub>2</sub> ) <sub>2</sub> : [13454-89-2]		Peterson BH Mevers EL	
(1) Copper round, Cu(103/2, [1545 + 65 2]		receison, b.m., Meyers, E.D.	
(2) Magnesium sulfate; $MgSO_4$ ; [7487-88-9]		J. Am. Chem. Soc. <u>1930</u> , 52, 4853-7.	
· · · · ·	1	Proc. Iowa Acad. Sci. <u>1930</u> , 37, 223-4.	
(3) Water; $H_2O$ ; [7732-18-5]			
	- (		
VARIABLES:	- P	PREPARED BY:	
Concentration of MgSO <sub>4</sub>			
1/K = 298		H. Miyamoto and E.M. Woolley	
		· · · · · · · · · · · · · · · · · · ·	
EXPERIMENTAL DATA:			
[			
The solubility of Cu(IO <sub>3</sub> ) <sub>2</sub> in aqueous MgSO <sub>4</sub> solution	ons at	t 25°C was given as:	
		•	
ionic strength MgS	504 cc	oncn <sup>a</sup> solubility	
mol dm-3 mo	ol dm <sup>.</sup>	-3 mol dm-3	
0.01100	•	0.000(00)	
0.01108 0.	.0	0.0036935	
0.01338 0.	.00050	0 0.003794	
0.01554 0.	.00100	0 0.003845	
0.03288 0.	.00507	7 0.004194	
0.05358 0.	.01000	0 004526	
0.21776 0	05000	0 005021	
0.21770 0.	10000	0.0000000	
0.4180/ 0.	.10000	0 0,006225	
2.03388 0.	.50000	0 0.011294	
<sup>a</sup> Calculated by the compilers from $[MgSO_4] = {(ion)}$	ic stre	ength) - 3(solubility))/4.	
<sup>b</sup> Compilers calculate K = 2.0 x 10-7 mol3 dm-9 fr	om th	his data noint	
$= 2.0 \times 10^{-1} \text{ mol}^{-11}$	om m	ins data point.	
AUXILIAI	RY IN	VFORMATION	
	r		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
$5 \propto C_{\rm H}(10_{\rm c})_{\rm c}H_{\rm c}$ were added to 250 cm <sup>3</sup> of MaSO.	. 1	CullOn and HaO prepared from purified CuSO, and KIO.	
Colution in Duran False acted to 250 cm <sup>-</sup> of Mg504		colutions has dramming at liting inter a language of	
solution in Pyrex Erlenmeyer flasks fitted with stop	pers	solutions by dropwise addition into a large volume of	
through which a stirring rod extended. The flasks	- 1	doubly distilled water kept at 60°C and constantly	
vere thermostatted and gently agitated for 5 d, and		stirred. The ppt was washed several times by decanta-	
then allowed to stand for 12 h. Solutions were		tion, and was sedimented in a tall cylinder; all particles	
analyzed for IO by addition of KI and HeSO		that did not settle were sinhoned off. The not was	
followed by titestion with 0.05 mol dm-3 No.S.O.	- 1	then filtered and dried over CoCL and analyzed	
Nonowed by thration with 0.05 mor un-o Na25203		then intered and dried over CaCl <sub>2</sub> , and analyzed.	
which was previously standardized with standard K.	103		
solution. Reproducibility in the presence of varying	g [	MgSO <sub>4</sub> was recrystallized and dried.	
amounts of Cu <sup>2+</sup> was within 0.1 %.			
	(		
		· · · · · · · · · · · · · · · · · · · ·	
]	l l	ESTIMATED ERROR:	
	13	Soly: precision $\pm 0.1$ %.	
		Temp: precision $\pm$ 0.02 K.	
	L		
		REFERENCES:	
	ľ		
1			
	]		
[	[		

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9] (3) Perchloric acid; HClO <sub>4</sub> [7601-90-3] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Ramette, R.W. J. Chem. Educat. <u>1959</u> , 36, 191-3.
VARIABLES: Concentrations of HClO <sub>4</sub> and LiClO <sub>4</sub> Temperature probably 298 K		PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA:		
HClO <sub>4</sub> concn mol dm <sup>-3</sup> 0.010	LiClO₄ c mol d 0.990	$\begin{array}{llllllllllllllllllllllllllllllllllll$
0.300	0.700	0.00799
0.700	0.300	0.0106
1.00	0.000	0.0123
Assuming the only important equilibria to be $Cu(IO_3)_2(s) = Cu^{2+} + 2IO_3^{-}$	K₀0	$_{0} = [Cu^{2}+][IO_{3}^{-}]^{2}$
$HIO_{\circ} = H^{+} + IO_{\circ}^{-}$	к.	= [H+]IIO1/[HIO_1
$2S^{3/2} = (K_{s0})^{1/2} \{1 + [$ The data give $K_a = 0.47$ mol dm <sup>-3</sup> and $K_{s0} = 7.6$ (compiler).	HCIO4]/ 5 x 10-7	/K <sub>a</sub> ]} <sup>7</sup> mol <sup>3</sup> dm <sup>-9</sup> at an ionic strength of 1 mol dm <sup>-3</sup>
AUXII	LIARY I	INFORMATION
METHOD/APPARATUS/PROCEDURE: Excess solid copper iodate and water containing HClO <sub>4</sub> and NaClO <sub>4</sub> were placed into a bottle. A motor driven stirrer was inserted into the bottle, and the system stirred for 2 or 3 days. Excess copper iodate removed by filtration, and 5 cm <sup>3</sup> aliquots of saturated solution removed with a pipet. Adding water and HCl, the idoate concentration was determined by titration with 0.02 mol dm <sup>-3</sup> Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution using starch as the indicator.		SOURCE AND PURITY OF MATERIALS: Solid copper iodate was prepared as described by Peterson (1,2), although HIO <sub>3</sub> may have been used in place of KIO <sub>3</sub> . The purities and sources of other materials are not given.
The experimental temperature was not specified, but the compiler assumes it was around 25°C.		
[		ESTIMATED ERROR:
		Nothing specified.
		<b>REFERENCES:</b> (1) Peterson, B.H.; Meyers, E.L. J. Am. Chem. Soc. <u>1930</u> , 52, 4853. (2) Peterson, B.H. J. Chem. Educat. <u>1957</u> , 34, 612.

COMPONE		<u> </u>	ORIGINAL	MEASUREMENTS:		
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]		Ramette, R.W.; Broman, R.F.				
						(3) Perchlo
(4) Water;	H <sub>2</sub> O; [7732-18-5]					
VADIADI			DEDADED	DV.		
Concn of l	LS: LiClO <sub>4</sub> at [HClO <sub>4</sub> ] =	0,0001 mol dm-3	TREFARED	<b>D</b> 1;		
T/K = 288	, 298 and 308		H. Miyamo	to and E.M. Woolley		
FXPERIM	ENTAL DATA:	<u></u>	· ···	- <u></u>		
Note that	for all solutions halo	w the concentration of H	CIO, is const	tant at 0.0001 mol dm		
Note that	for an solutions belo	w, the concentration of H		ant at 0.0001 mor di	· · ·	
	LiClO <sub>4</sub> concn	Cu(IO <sub>3</sub> ) <sub>2</sub> soly		LiClO <sub>4</sub> concn	Cu(IO <sub>3</sub> ) <sub>2</sub> soly	
t/ºC	mol dm-3	mol dm-3	t/ºC	mol dm-3	mol dm-3	
147	0.000	0 00276	25.0	0.000	0.00324	
н	0.025	0.00330	11	0.0025	0.00329	
	0.050	0.00352		0.0060	0.00338	
н	0.075	0.00378	H	0.025	0.00378	
	0.100	0.00389	H	0.050	0.00400	
			H	0.075	0.00418	
			H	0.100	0.00437	
35.0	0.000	0.00369				
"	0.025	0.00416				
**	0.050	0.00444				
"	0.075	0.00469				
"	0.100	0.00486				
			cont	inued		
		AUXILIARY I	NFORMATI	ON		
METHOD	/APPARATUS/PRO	CEDURE:	SOURCE A	ND PURITY OF MA	TERIALS:	
Method sa	me as in (1). Exces	s Cu(IO <sub>2</sub> ) <sub>2</sub> ,H <sub>2</sub> O added to	Cu(IO <sub>3</sub> ) <sub>2</sub> •H·	O prepared by addin	g 3 mol dm <sup>-3</sup> HIO <sub>3</sub>	
LiClO <sub>4</sub> sol	utions containing H	$ClO_{4}$ to supress hydroly-	and 1 mol o	im- <sup>3</sup> CuSO₄ solutions	to hot water with	
sis. Soluti	ons were rotated in	borosilicate glass bottles	constant sti	rring. The product w	as washed with hot	
for 2 d in	a thermostat at 38%	C, and then transferred to	water using	a repetitive process	of partial sedimentation	
a water ba	th thermostated at 3	5.0°C where they stood	followed by decantation to remove the smaller particles.			
for 3 d wi	th occasional shakin	g. Saturated solutions	After dryin	g, analysis by iodome	etric titration with	
were filter	red through fine por	ous glass by pressure,	thiosulfate gave a purity of 99.9 %.			
and 5 cm <sup>3</sup>	aliquots were pipet	ted into titration flasks.				
Aliquots v	vere treated with 2 r	nl of 0.1 mol dm- <sup>3</sup> acetic	LiClO <sub>4</sub> and	HClO <sub>4</sub> were reagent	grade.	
acid + 0.1	mol dm-8 sodium ac	cetate buffer, and I drop	[			
of Snazoxs	indicator: the solution	ion was then titrated with				
EDTA. I	he EDTA solutions	were standardized with	LSIIMAIR	D ERROR;		
weighea q	uantities of pure ele	ctrolytic copper, and	Soly: reproc	ucidility within 0.2 y	%.	
uuplicate	intrations agreed to v	<i>vitnin</i> 0.2 %.	remp: notn	ing specified.		
The bottle	s and remaining solu	utions were then equi-				
librated in	s and remaining son	t 25 0°C, and finally at	REFERENC	TFS.		
14.70C an	d aliquots for analy	ses were taken at each	(1) Ramette	RW Dratz FA	J Phys Chem. 1963	
temperatu	re		67. 940			

COMPONENTS:	ORIGINAL MEASUREMENTS:	
<ol> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Lithium perchlorate; LiClO<sub>4</sub>; [7791-03-9]</li> </ol>	Ramette, R.W.; Broman, R.F.	
<ul> <li>(3) Perchloric acid; HClO<sub>4</sub> [7601-90-3]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	J. Phys. Chem. <u>1963</u> , 67, 942-4.	

#### EXPERIMENTAL DATA: (continued.....)

 $K_{s0}$  was calculated by the authors as  $K_{s0} = 4S^3Y$  where S is the experimental solubility and Y is the Debye-Huckel activity relation

$$\log Y = -6A/^{1/2}/(1 + B/^{1/2})$$
[1]

 $I = 3S + [LiClO_4] + [HClO_4]$  [2]

The calculations were carried out by plotting  $-\log(4S^3)$  versus  $I^{1/2}$  while varying B so that the value of A was precisely the theoretical value at each temperature. The results are summarized below, and include the evaluation of the Gibbs free energy, enthalpy and entropy obtained in the usual way from a  $-\log K_{*0}$  vs 1/(T/K) plot. All are based on mol dm<sup>-3</sup> units, and the uncertainties expressed refer to the 90 % confidence intervals.

	Aa	В	
t/ºC	mol <sup>-1/2</sup> dm <sup>3/2</sup>	mol <sup>-1/2</sup> dm <sup>3/2</sup>	-log $K_{s0}$
14.7	0.501	1.33	7.31 ± 0.04
25.0	0.509	1.72	7.13 ± 0.03
35.0	0.519	1.97	6.97 ± 0.02

\*Note: The authors point out that in carrying out the least squares treatment of the solubility data, the "best fit" does not correspond to the case where A is the theoretical value in eq. [1]. In fact, at 25°C, the sum of squares of deviations for the fit with A constrained to equal the theoretical values is 0.00059, whereas the "best fit" gives 0.00039 for the sum of the squares of deviations: in this case  $B = 3.2 \text{ mol}^{-1/2} \text{ dm}^{-3/2}$  and  $A = 0.752 \text{ mol}^{-1/2} \text{ dm}^{-3/2}$  which gives  $-\log K_{s0} = -7.21$ .

ΔG <sub>s0</sub> kcal mol <sup>-1</sup>	ΔH <sub>s0</sub> kcal mol <sup>-1</sup>	$\Delta S_{s0}$ cal K <sup>-1</sup> mol <sup>-1</sup>
9.73 ± 0.03	6.77± 0.042	-9.91 ± 1.5

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Copper iodate; $Cu(10_{3})_2$ ; $[13454-89-2]$ (2) Lithium perchlorate; $LiClO_4$ ; $[7791-03-9]$ (3) Perchloric acid; $HClO_4$ ; $[7601-90-3]$	Gamsjager, H.; Gerber, F.; Antonsen, O.	
(4) Water; H <sub>2</sub> O; [7732-18-5]	Chimica <u>1973</u> , 27, 94-7	
VARIABLES:	PREPARED BY:	
T/K = 274, 288, 298  and  308.	H. Miyamoto and E.M. Woolley	

Using LiClO<sub>4</sub> and HClO<sub>4</sub> to maintain a constant ionic strength of 1.0 mol kg<sup>-1</sup>, the soly of  $Cu(IO_3)_2$  was reported graphically. The data were analyzed in terms of the following eqns defining F as  $2(soly)^{1.5}$  where concentrations are based on mol kg<sup>-1</sup> units (note that activity coefficients are assumed to equal unity):

$$F = 2\{Cu^{2^*}\}^{1.5} = K_{*0}^{1/2} \left(1 + \frac{\{H^*\}}{K_a}\right)$$

where

$$K_{s0} = \{Cu^{2*}\}\{IO_3^{-}\}^2 \text{ and } K_a = \{H^*\}\frac{\{IO_3^{-}\}}{\{HIO_3^{-}\}}$$

From material balance requirements and least squares fitting, the following were reported:

t/°C	$-\log K_{s0}$	$-\log K_{a}$	Cu(IO <sub>3</sub> ) <sub>2</sub> /mol kg <sup>-1a</sup>
1	6.366 ( $\sigma = 0.025$ )	$0.215 \ (\sigma = 0.018)$	0.0047 <sub>s</sub>
15	$6.207 (\sigma = 0.015)$	$0.297 (\sigma = 0.010)$	0.00537
25	$6.083 (\sigma = 0.030)$	$0.306 (\sigma = 0.020)$	0.00592
35	5.978 ( $\sigma = 0.035$ )	$0.351 (\sigma = 0.025)$	0.00641

<sup>a</sup>Solubilities calcd by compilers from  $(K_{s0}/4)^{1/3}$  (note ionic strength = 1.0 mol kg<sup>-1</sup>).

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Isothermal method. Excess cupric iodate hydrate was placed in glass ampoules and LiClO <sub>4</sub> and HClO <sub>4</sub> solutions added to maintain the ionic strength at 1.0 mol kg <sup>-1</sup> . The ampoules were sealed and shaken in a water thermostat with a precision in temperature of $\pm 0.1^{0}$ C. After equilibrium was reached, samples of saturated solution were removed by millipore filtration and analyzed for cupric iodate by iodometric titration. X-ray powder diffraction patterns of the solid phase before and after equilibration indicated the solid phase to be Cu <sub>3</sub> (IO <sub>3</sub> ) <sub>6</sub> ·2H <sub>2</sub> O.	$Cu_3(IO_3)_6$ ·2H <sub>2</sub> O prepared as in (1) and structure con- firmed by X-ray analysis. LiClO <sub>4</sub> prepd from Li <sub>2</sub> CO <sub>3</sub> and HClO <sub>4</sub> followed by several recrystallizations. HClO <sub>4</sub> was reagent grade, water was distilled twice from a quartz still.		
	ESTIMATED ERROR:		
	Standard deviations for K <sub>\$0</sub> given above. Temp: precision ± 0.1 K.		
	REFERENCES: (1) Ramette, R.W.; Broman, R.F. J. Phys. Chem., <u>1963</u> , 67, 942.		

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium chloride; NaCl; [7647-14-5] (3) Sodium perchlorate; NaClO <sub>4</sub> ; [7775-09-9] (4) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Ramette, R.W.; Fan, G. Inorg. Chem. <u>1983</u> , 22, 3323-6.
VARIABLES: Concentration of NaCl and NaClO <sub>4</sub> . T/K = 298 and 308.	PREPARED BY: H. Miyamoto and M. Salomon

Using NaClO<sub>4</sub> to maintain a constant ionic strength of 5.0 mol dm<sup>-3</sup>, the soly of  $Cu(IO_3)_2$  in solutions of varying NaCl concentration was given as (all concentrations in units of mol dm<sup>-3</sup>):

$t/^0C = 2$	25	t/ºC =	= 35			
NaCl concn	Cu(IO <sub>3</sub> ) <sub>2</sub> soly	NaCl concn	Cu(IO <sub>3</sub> ) <sub>2</sub> soly			
0.09900 0.19960 0.29807 0.40141 0.50233 0.69875 0.79683 1.2964 1.6967	0.003994 0.004219 0.004477 0.004739 0.005003 0.005555 0.005864 0.007302 0.008513	0.09870 0.19899 0.29717 0.40020 0.50080 0.69662 0.79619 1.2924 1.6915	0.004060 0.004384 0.004377 0.005001 0.005305 0.005936 0.006290 0.007952 0.009337	SOLVENT		
2.4967 3.5032 4.9904	0.01106 0.01440 0.01986	2.4889 3.4921 4.9742	0.01221 0.01613 0.02235	SOLUTE FRIT SATURATED SOLUTION		
	AUXILIARY INFORMATION					

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#### METHOD/APPARATUS/PROCEDURE:

Method previously described in (1) which is basically very similar to the saturation column method originated by Monk et al. (see the compilations of the papers by Monk et al. throughout this volume). The solubility vessel (see figure above) consisted of a fine porosity sealing tube, the upper half of which was packed with about 7 g of  $Cu(IO_3)_2$ . A few ml of solvent (NaClO<sub>4</sub> + NaCl solution) were added to the top of the tube, and the fritted tube placed in a screw-capped test tube. The sealed assembly was placed in a water bath controlled at 25.06  $\pm$  0.005°C. The initial output of solution was discarded, and the inner fritted tubes refilled with fresh solvent. Aliquots (0.005 ml accurate to  $\pm$  0.0001 g) were withdrawn for analysis with a calibrated transfer pipet. Saturated solutions were analyzed coulometrically with 0.02 mol dm<sup>-3</sup> EDTA added to mask copper(II) against reduction. Saturated solutions were prepared and analyzed on a mass basis, and final conversion to volume units were made with density measurements (densities were not reported). Saturated solutions coulometrically analyzed for iodate by reduction at a mercury pool or Pt gauze electrode. Calibration of the method using recrystallized KIO<sub>3</sub> gave an accuracy of analysis of about 0.03 %. The solid phases of copper iodate were stated to be slow to equilibrate, and fresh portions of solvent were added repeatedly until the observed solubilities were reproducible to within 1 ppt.

The authors fitted the solubility data to a smoothing equation assuming the species in solution were  $Cu^{2+}$ ,  $CuIO_{3^+}$ ,  $Cu(IO_3)_2$ , and  $CuCl_n^{2-n}$  for n = 1 to 4. Neglecting activity coefficients in these solutions of 5.0 mol dm<sup>-3</sup> total ionic strength, excellent fits were obtained based on the agreement between observed and calculated solutilities. The authors also computed Gibbs energies, enthalpies and entropies of solution based on this least squares smoothing equation applied to two temperatures: the reader is referred to the original literature in the event that these calculations are of interest.

continued.....

COMPONENTS: $(1)$ Components:	ORIGINAL MEASUREMENTS:	
(1) Copper Iodale, $Cu(10_{3/2}, [15454-69-2])$ (2) Sodium chloride: NaCl: $[7647-14-5]$	Ramette, R.W.: Fan, G.	
(3) Sodium perchlorate: NaClO <sub>4</sub> : $[7775-09-9]$		
(4) Water; $H_2O$ ; [7732-18-5]	Inorg. Chem. <u>1983</u> , 22, 3323-6.	
AUXILIARY I	NFORMATION (continued)	
SOURCE AND PURITY OF MATERIALS:		
$Cu(IO_3)_2$ was prepared by slow addition of NaIO <sub>3</sub> and 0 precipitate was thoroughly washed and placed in a Soxh recrystallized product was obtained after 1 week. The solid stoichiometry of $3Cu(IO_3)_2 \cdot 2H_2O$ .	CuSO <sub>4</sub> solutions to hot 0.1 mol dm <sup>-3</sup> HNO <sub>3</sub> . The tlet with 0.02 mol dm <sup>-3</sup> HNO <sub>3</sub> in the boiling flask, and a mass loss upon heating to $300^{\circ}$ C suggested an original	
$Cu(ClO_4)_2$ stock solutions were analyzed by EDTA titration with Murexide indicator by potentiometric titration using a Hg indicator electrode, and by controlled potential coulometric deposition using both Hg-pool and Pt gauze electrodes. Accuracy and precision of iodate determination checked with recrystallized KIO <sub>3</sub> , and the authors report standard deviations of around 0.03 %.		
All solutions were prepared with AR grade NaCl using NaClO <sub>4</sub> to adjust the ionic strength to 5.00 mol dm <sup>-3</sup> .		
ESTIMATED ERROR:	*****	
Standard deviation in the coulometric determination of reproducibility in the observed solubilities was stated to	iodate reported to be about 0.03 %, and the be less than 1 ppt.	
The temperature control (precision) was stated to be ±	0.005 K.	
REFERENCES:		
(1) Ramette, R.W. Anal. Chem. $1981$ , 53, 2244.		

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium perchlorate; NaClO <sub>4</sub> ; [7775-09-9] (3) Perchloric acid; HClO <sub>4</sub> [7601-90-3] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Ramette, R.W. J. Chem. Educat. <u>1959</u> , 36, 191-3.
VARIABLES: Concentrations of HCIO <sub>4</sub> and NaCIO <sub>4</sub> Temperature probably 298 K		PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA:		
HClO4 concn mol dm <sup>-3</sup>	NaClO <sub>4</sub> mol d	concn Cu(IO <sub>3</sub> ) <sub>2</sub> soly m <sup>-3</sup> mol dm <sup>-3</sup>
0.010 0.300 0.700 1.00	0.990 0.700 0.300 0.000	0.00649 0.00872 0.0110 0.0122
Assuming the only important equilibria to be		
$Cu(IO_3)_2(s) = Cu^{2+} + 2IO_3^{-}$	K <sub>s0</sub>	$= [Cu^{2+}][IO_{3}^{-}]^{2}$
$HIO_3 = H^+ + IO_3^-$	Ka	= [H+][IO <sub>3</sub> -]/[HIO <sub>3</sub> ]
the author derived the equation for the solubili	ity, S (neg	ecting activity coefficients)
$2S^{3/2} = (K_{s0})^{1/2} \{1 +$	[HCIO <sub>4</sub> ]/	K <sub>a</sub> )
The data give $K_a = 0.5_2$ mol dm <sup>-3</sup> and $K_{s0} = 1$ . HClO <sub>4</sub> concentrations for an ionic strength of 1	.0 <sub>6</sub> x 10 <sup>-6</sup> 1 mol dm <sup>-</sup>	mol <sup>3</sup> dm <sup>-9</sup> (compilers result using the slope at low <sup>-3</sup> ).
AUXI	LIARY I	NFORMATION
METHOD/APPARATUS/PROCEDURE: Excess solid copper iodate and water containing $HClO_4$ and $NaClO_4$ were placed into a bottle. A motor driven stirrer was inserted into the bottle, and the system stirred for 2 or 3 days. Excess copper iodate removed by filtration, and 5 cm <sup>3</sup> aliquots of saturated solution removed with a pipet. Adding water and HCl, the idoate concentration was determined by titration with 0.02 mol dm <sup>-3</sup> $Na_2S_2O_3$ solution using starch as the indicator.		SOURCE AND PURITY OF MATERIALS: Solid copper iodate was prepared as described by Peterson (1,2), although HIO <sub>3</sub> may have been used in place of KIO <sub>3</sub> . The purities and sources of other materials are not given.
The experimental temperature was not specified the compiler assumes it was around 25°C.	d, but	
		ESTIMATED ERROR:
		Nothing specified.
		REFERENCES: (1) Peterson, B.H.; Meyers, E.L. J. Am. Chem. Soc. <u>1930</u> , 52, 4853. (2) Peterson, B.H. J. Chem. Educat. <u>1957</u> , 34, 612.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium perchlorate; NaClO <sub>4</sub> ; [7775-09-9] (3) Perchloric acid; HClO <sub>4</sub> [7601-90-3] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUR Marchall, J.C.; Blanc At. Absorption News	REMENTS: hard, D.P. letter <u>1967,</u> 6, 109-11.	
VARIABLES: Concentrations of NaClO <sub>4</sub> and HClO <sub>4</sub> T/K = 298, 308 and 323			PREPARED BY: H. Miyamoto and E.I	M. Woolley
EXPERIM	ENTAL DATA: Fina HClO <sub>4</sub> concn	al solubility, S, is the a NaClO <sub>4</sub> concn	verage of three results fr values of 10 <sup>3</sup> S	om the same saturated solution. ave 10 <sup>3</sup> S

t/°C	mol am-s	mol dm-s	mol dm <sup>-3</sup>	mol am-s
25	0.010	0.990	6.17, 6.17, 6.15	6.16
	0.300	0.700	8.40, 8.35, 8.35	8.37ª
	0.700	0.300	10.52, 10.59	10.56
	1.000	0.000	12.09, 12.11, 12.05	12.08
35	0.010	0.990	not reported	7.12
	0.300	0.700		9.75
	0.700	0.300		12.69
	1.000	0.000		14.52
50	0.010	0.990		7.95
	0.300	0.700		10.58
	0.700	0.300		13.58
	1.000	0.000		17.10

<sup>a</sup>Calculated by compilers: the authors gave an incorrect value for this average.

The authors suggest that the data can be interpreted in terms of solubility equilibria and the acid association constant K<sub>a</sub> for HIO<sub>3</sub> according to:  $2S^{3/2} = (K_{s0})^{1/2} \{1 + [HClO_4]/K_a\}$ . For 25, 35 and 50°C, respectively, the compilers estimate  $K_{s0}/mol^3 dm^{-9} = 9.0 \times 10^{-7}$ , 1.38 x 10<sup>-6</sup>, and 1.94 x 10<sup>-6</sup> and with respective values for  $K_{a}$ /mol dm<sup>-3</sup> = 0.49, 0.47 and 0.53.

#### **AUXILIARY INFORMATION**

METHOD/APPARATUS/PROCEDURE: Solutions were equilibrated with stirring in a bath at the desired temperature for a minimum of 24 h. Samples were withdrawn for analyses through a medium porosity frit. The Cu determinations were	SOURCE AND PURITY OF MATERIALS: Copper iodate was prepared according to ref. (1) by adding dilute solutions of CuSO <sub>4</sub> and KIO <sub>3</sub> to a large volume of water. Fine particles resulting from this preparation were separated by repeated decantation,
made with a Perkin Elmer 303 atomic absorption spectrometer with the input stabilized. A multi- element lamp (Cu, Mn, Co, Ni and Cr) was used at 324.7 nm. Because of the relative high solubility of Cu( $IO_3$ ) <sub>2</sub> , further dilutions of the saturated solutions by factors of 3, 4, or 5 to 100 was necessary to bring the	and the product was air-dried. All other reagents were of the best commercial grades available, and were used as received.
absorption into the 60-80 % range, which is the range giving maxium precision. Standards were prepared to closely bracket (within 10 %) the absorption of the sample. Each sample was prepared in triplicate and run in alternate sequence with appropriate standards.	ESTIMATED ERROR: Soly: reproducibility indicated in above table. Temp: nothing specified.
water was run between each solution analysis, and zero checks were made after each reading.	<b>REFERENCES:</b> (1) Peterson, B.H. J. Chem. Educat. <u>1957</u> , 34, 612.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Potassium iodate; KIO <sub>3</sub> ; [7758-05-6] (3) Copper sulfate; CuSO <sub>4</sub> ; [10124-44-4] (4) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL MEASUREMENTS: Spencer, J.F. Z. Phys. Chem. <u>1913</u> , 83, 290-6.			
VARIABLES: Concentration of CuSO <sub>4</sub> or KIO <sub>3</sub> T/K = 298			PREPAR	ED BY:		
EXPERIMENTA satd Cu(IO <sub>3</sub> ) <sub>2</sub> sol	L DATA: Equilibre utions containing	ium activities of CuSO <sub>4</sub> or KIO <sub>3</sub> ,	f Cu <sup>2+</sup> with	and IO <sub>3</sub> - the follow	were determined by ving results:	y emf measurements on
CuSO <sub>4</sub> concn	KIO <sub>3</sub> concn	E <sub>1</sub>	10³a	(Cu <sup>2+</sup> )	10 <sup>3</sup> a(IO <sub>3</sub> -)	10 <sup>7</sup> K <sub>a0</sub>
mol dm-3	mol dm-3	volts	(eq.	[2])	(eq. [3])	(eq. [4])
1.000	0.0000	0.2490	106	2	0 965	1.47
0.500	0.0000	0.2480	01	18	1.27	1.47
0.250	0.0000	0.2361	78	0	1.27	1.47-
0.100	0.0000	0.2236	29	6	2.27	1.46
0.050	0.0000	0.2193	21	2	2.63	1.46
0.010	0.0000	0 1976	3	94a	6.09	1 463
0.000	0.0625	0 1440	0	0619	48.4	1.40
0.000	0.0312	0 1608	0	0228	25 2a	1 45a
0.000	0.0156	0 1759	0	735	14.0	1.45
0.000	0.0078	0.1805	0	105	11.8	1.45
0.000	0.0039	0.1936	2	8Qa	7 10	1.458
0.000	0.0035	0.1081	2. A	11	5.05	1.45
0.000	0.0000	0.2065	7	.88	4.31	1.46
Calculated by compiler from eqs. [2]-[4]: the author made data points.			de an erro	or in computation in contin	eqs. [2] and [3] with these ued	
		AUXILIA	RY I	NFORMA	TION	
METHOD/APPA	RATUS/PROCED	URE:		SOURCE	AND PURITY OF	MATERIALS:
Emf measuremen	nts were made on t	the cell		$Cu(IO_3)_2 \cdot H_2O$ prepared by adding excess $KIO_3$ solution to concentrated $Cu(NO_3)_2$ solution. The crystals were		
Hg,Hg(IO <sub>3</sub> ) <sub>2</sub>   s	$\ln \left  \left  KCl(c_1) \right  Hg_2$	Cl <sub>2</sub> ,Hg [1]		washed a be 4.12 9	nd dried in air. Wa 6 by heating in an a	ter content was found to ir bath to 250°C. Iodate
where $c_1 = 0.1$ mol dm <sup>-3</sup> and "sln" is the experimental solution. Hg,Hg(IO <sub>3</sub> ) <sub>2</sub> and "sln" were equilibrated for 3 d with shaking and over which period the potentials were constant to 1.0 mV per day. Activities based on mol dm <sup>-3</sup> units were calcd from eqs. [2] and [3].			detd by t followed Similar a iodate. H	reating an aqueous s by titrn with Na <sub>2</sub> S <sub>2</sub> nalysis of the anhyd Heating a sample to b	solution with KI and HCl O <sub>3</sub> yielding 81.28 %. rous solid yielded 84.74 % CuO gave 18.77 % CuO.	
E = 0.6060 + 0	0.0297 <i>log</i> a(Cu <sup>2+</sup> )	[2]	1		TED ERROR:	
E = 0.4027 - 0.0000	).0595 <i>log</i> a(IO <sub>3</sub> -)	[3]		Nothing	specified.	
These were obtained from [1] above where the "sln" was 0.010 to 1.0000 mol dm <sup>-3</sup> CuSO <sub>4</sub> or KIO <sub>3</sub> (see ref. (1)). Solutions were corrected for ion pairing evaluated from conductivity data.			REFERENCES: (1) Spencer, J.F. Z. Phys. Chem. <u>1913</u> , 80, 701.			

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Spencer, J.F.
(2) Potassium iodate; KIO <sub>3</sub> ; [7758-05-6]	
(3) Copper sulfate; CuSO <sub>4</sub> ; [10124-44-4]	Z. Phys. Chem. <u>1913</u> , 83, 290-6.
(4) Water; H <sub>2</sub> O; [7732-18-5]	
EXPERIMENTAL DATA: (continued)	
The values of the thermodynamic solubility proc	duct, $K_{s0}$ , were calculated from
$\log K_{s0} = \{a(Cu^{2+})\}\{a(ICu^{2+})\}$	D <sub>3</sub> -)} <sup>2</sup> [4]
and are therefore in units of mol <sup>3</sup> dm <sup>-9</sup> . From	eqs. [2] and [3] the compiler calculates
$-\log K_{s0} = 2(0.6060 - 0.4027)/0$	.0595 = 6.83 <sub>4</sub> [5]
which gives $K_{s0} = 1.47 \times 10^{-7} \text{ mol}^3 \text{ dm}^{-9}$ . The 1.457 x 10 <sup>-7</sup> . Using $K_{s0} = 1.467 \times 10^{-7}$ and eqs. Cu(IO <sub>3</sub> ) <sub>2</sub> in pure water.	average value of $K_{s0}$ for the data table on the previous page is [6] to [8] below, the compiler calculated the solubility, S, of
$K_{s0} = (4S^3)(Y) = 1.46_7 \times 10^{-3}$	)-7 [6]
$log Y = -6(0.509)I^{1/2}/(1 +$	[ <sup>1</sup> / <sub>2</sub> ) [7]
I = 3S	[8]
$S = 4.2_0 \times 10^{-3} \mod dm^{-3}$	[9]

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COMPON	IENTS:		ORIGINAL M	EASUREMENTS:	
(1) Coppe	r iodate: Cu(IO <sub>2</sub> ) <sub>2</sub> : [13	454-89-21	Ghosh, R.; Nair, V.S.K.		
(2) Sodiu	m hydroxide: NaOH: []	310-73-21	· · · · · · · · · · · · · · · · · · ·		
(3) Potass	ium hydrogen phthalat	e: C.H.O.K. (877-24-7)	J. Inorg. Nuc	I. Chem. 1970 32.	3033-9
(4) Water	H_O. [7732-18-5]	·, •6904.c, [•·· = · ·]	of morginite	11 Olicini <u>1270</u> , 02, 1	
(1)	, 1120, [1102 10 0]				
VADIADI	TC.		DDEDADED D		
Concentra	tions of NaOH and C.	H <sub>6</sub> O <sub>2</sub> K	FREFARED D	1:	
T/K = 29	8, 303, 308 and 318		H. Miyamoto	and E.M. Woolley	
EXPERIM	IENTAL VALUES:				
Cal	H₅O₄K total concn	Cu(IO <sub>3</sub> ), solv	- log Kan	- log Kaz	- log K.o
t/ºC	mol dm <sup>-3</sup>	mol dm-3		dz	**880
25	0	0.003533			7.048
	0.002462	0.004137	3.11		
	0.004925	0.004187	3.14	0.99	
	0.012362	0.004901	3.16	1.02	
	0.024003	0.005640	3.15	0.99	
	0.024623	0.005645	3.14	0.98	
		average	es: $3.14 \pm 0.03$	0.99 + 0.03	
			-		
30	0	0.003764			6.980
	0.001234	0.004151	3.36		
	0.002463	0.004427	3.27	1.13	
	0.004928	0.004603	3.26	1.04	
	0.009948	0.004739	3.26	1.03	
	0.012311	0.005314	3.28	1.11	
		average	es: 3.28 ± 0.08	1.08 ± 0.05	
Note that	in each solution, [NaO	$H_{tot} = \frac{1}{2} [C_8 H_5 O_4 K]_{tot}$			
				continued	
			FORMATION		
METHOD	APPARATUS/PROCI	EDURE:	SOURCE AND	PURITY OF MAT	ERIALS:
Saturating	column method used a	as in (1). All slns	Cu(IO <sub>3</sub> ) <sub>2</sub> prepa	red by dropwise ad	dition of KIO <sub>3</sub> and
prepd by	dilution of a stock sln.	and the pH measured	CuCl <sub>2</sub> solution	s into a large volum	e of dist water at
before and	d after equilibration the	rough the column at	65°C with stirr	ing for 2 h. The p	ot was washed 6
least 4 tim	es (twice was sufficien	t for saturation). The	times and dige	sted in double dist y	water for 4 h at 80°C.
pH of all	slns were in the range	of 3.7 to 3.8.	AnalaR chemic	als were used where	ever possible.
Sins analy	zed for iodate by iodor	netric titro in a	Sodium potassi	um phthalate solutio	ons prepd with CO <sub>2</sub> -
nitrogen a	tmos The thermodyna	mic solublity product	free NaOH soli	ution so as to obtain	a 1.1 buffer ratio.
constant u	unos. The mermodyne vas caled from	intersection product	Conductivity w	vater was prepared h	w mixed bed
constant a			deionization	ator was propured t	y mixed bed
	$K = (Cu^2 +)(IO_{2})$	12v.v.			
	$x^{*0} = [c_{n_{-1}}][103]$	J <sup>-</sup> J 1 J 2	ESTIMATED I	FRROR.	
where acti	vity coefficients y, and	d v. were cold from	Solv nothing s	nacified Average e	errors in K, values
the modifi	ied Davies con (2) K.	for the CulO <sub>2</sub> - ion	soly. nothing s	ista tablas	ators in red values
nnie inclus	let Davies eqn $(2)$ . $\mathbf{R}_{d}$	V (NoIO) assumed	given in c		
to be 2.0 -	not dm-8 at 200 K	d values at Linkan	Temp: precisio		
	noi um - at 298 K, and	a values at higher	DEEEDENCEG	•	
temperatu	res were estimated.		KEPEKENCES	; V 1 01 0	20 2471
			(1) Davies, C.V	v. J. Unem. Soc. <u>19</u>	<u>20,</u> 2471.
			(2) Davies, C.V	v. ion Association. I	butterworths,
			London, <u>19</u>	<u>ov</u> .	

COMPON	NENTS:		ORIGINAL MI	EASUREMENTS:	
(1) Copp	er iodate; Cu(IO	3)2;[13454-89-2]	Ghosh, R.; Na	ir, V.S.K.	
(2) Sodiu	m hydroxide; Na	aOH; [1310-73-2]			
(3) Potas	sium hydrogen p	hthalate; C <sub>8</sub> H <sub>5</sub> O <sub>4</sub> K; [877-24-7	] J. Inorg. Nucl	. Chem. <u>1970</u> , 32, 3	025-32.
(4) Water	; H <sub>2</sub> O; [7732-18	-5]			
EXPERI	MENTAL VALU	ES: (continued)			
C	3H₅O4K total con	ncn Cu(IO <sub>3</sub> ) <sub>2</sub> soly	- log K <sub>d1</sub>	- log K <sub>d2</sub>	- log K <sub>80</sub>
t/ºC	mol dm- <sup>3</sup>	mol dm-3			
35	0	0.003956			6.929
	0.001806	0.004176	3.55		•
i I	0.004925	0.004642	3.50	1.12	
	0.009948	0.005067	3.51	1.12	
[	0.019698	0.005800	3.49	1.12	
	0.020742	0.005807	3.49	1.12	
		averag	es: $3.50 \pm 0.01$	1.12	
40	٥	0.00/101	<b></b>	<b>_</b>	6 000
40	0 000460	0.004101	2.01		0.000
Į	0.002402	0.004491	3.61	1 26	
1	0.004925	0.004744	3.80	1.30	
1	0.003347	0.005285	3.70	1.51	
1	0.012301	0.005452	3.04	1.37	
	0.042332	0.000080	3.00	1.55	
	0.049240	0.008825 average	es: $3.79 \pm 0.07$	$1.34 \pm 0.03$	
ļ					
45	0	0.005484			6.536
	0.002802	0.005787	4.12		
	0.005604	0.006002	4.10	1.48	
[	0.016812	0.006912	4.12	1.50	
ļ	0.024623	0.007690	4.12	1.49	
	0.028020	0.008034	4.12	1.48	
	0.049246	0.009751	4.12	1.49	
		averag	es: $4.12 \pm 0.02$	$1.49 \pm 0.01$	
K <sub>d1</sub> and equation	$K_{d2}$ calculated f (2). The therm	rom eqs. [1] and [2] using usin odynamic equilibrium constan	ng activity coeffi ts are defined as	cients calculated from follows:	m a modified Davies
		$K_{d1} = [Cu^{2+}]y_1[C_8H_4O_4^{2-}]y_2/$	/[Cu(C <sub>8</sub> H <sub>4</sub> O <sub>4)</sub> )+]	[1]	
i i		$K_{d2} = [Cu^{2+}]y_1[C_8H_5O_4^-]y_2/[$	$Cu(C_8H_5O_4)^+y_2$	[2]	
The auth following	ors fitted the K. g thermodynamic	d values to the smoothing equation of the sm	ation <i>log</i> K <sub>d</sub> = a l on mol dm <sup>-3</sup> un	+ b(T/K) + c(T/K)² its).	and derived the
	reaction	ΔG/kcal mol <sup>-1</sup> ΔH/kcal m	nol-1 ΔS/cal K	(-1 mol-1	
]	[1]	4.28 ± 0.04 -9.49 ± 0.0	9 -46.2 ±	1.0	
	[2]	$1.36 \pm 0.054 -5.53 \pm 0.0$	06 -23.1 ±	: 0.8	
From a p mol-1.	olot of <i>log</i> K <sub>80</sub> v	s $1/(T/K)$ , the compilers obta	in (for 298 K) ∆	$H = 4.5 \text{ kcal mol}^{-1} \text{ a}$	and $\Delta S = -17$ cal K <sup>-1</sup>

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Methanoic acid (formic acid); CH <sub>2</sub> O <sub>2</sub> ; [64-18-6] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.		
VARIABLES: Concentrations of NaOH and form T/K = 298	nic acid	PREPARED BY: H. Miyamoto		
EXPERIMENTAL DATA:	<u></u>			·····
formic acid concn	NaOH concn	solubility		
mol dm-3	mol dm-3	mol dm-3	pH	10 <sup>2</sup> K <sub>d</sub> <sup>a</sup>
		0.00000		
0.0	0.0	0.00333		
0.03040	0.01237	0.00416	3.7	1.04
0.03462	0.02442	0.00484	4.0	1.06
0.04343	0.03165	0.00521	4.1	1.06
<sup>a</sup> K <sub>d</sub> for the copper-acid complex	reaction			
$Cu(CHO_2)^+ = Cu^{2+} +$	$CHO_2$ : $K_d =$	[Cu <sup>2+</sup> ][CHO <sub>2</sub> -]/[Cu	(CHO <sub>2</sub> )+]	
calculated using estimated activity	coefficients from the	following equation	Þ:	
$\log y_z = -(z)$	$^{2}/2)[AI^{1/2}/(1 + I^{1/2}) -$	0.2AI]		
In these calculations, the authors were equal to 0.15.	assumed that the ion p	airing dissociation of	constants for l	both $CuIO_3^-$ and $NaIO_3$
<sup>a</sup> In the original paper, the Debye-	-Huckel constant A wa	s omitted from this	equation.	
	AUXILIARY I	NFORMATION		
METHOD/APPARATUS/PROCE	DURE:	SOURCE AND PU	JRITY OF MA	ATERIALS:
Saturating column method used as in (2). A bulb containing the solv attached to a column containing C solution allowed to flow through the sufficient to insure saturation (1). was to connect the column to a set	t in (1) and modified vent solution was Cu(IO <sub>3</sub> ) <sub>2</sub> , and the the column at a rate The modification (2) second parallel arm in	Cu(IO <sub>3</sub> ) <sub>2</sub> crystals w trated solutions of nearly boiling wat "fines" washed out The formic acid u	vere prepared CuSO4 and K er. The produ sed was of Ar	by allowing concen- LIO <sub>3</sub> to drip slowly into uct was ground and the nalaR or Kahlbaum
which the saturated solution was apparatus was thermostated. A pusher solution was run through the sature second time. The iodate concentre d solutions were determined volutions $2^{2}O_{3}$ solution previously stand Th pH was measured with a glass	collected. The entire ortion of the saturated rating column a ations of the saturat- umetrically by using ardized with KIO <sub>3</sub> . electrode.	quality.		
		ESTIMATED ERF Soly: nothing spec Temp: precision ±	ROR: ified. 0.03 K.	
		REFERENCES: (1) Bronsted, N.J.; <u>1924</u> , 46, 555. (2) Money, R.W.; 400.	La Mer, V.K Davies, C.W.	5. J. Am. Chem. Soc. J. Chem. Soc. <u>1934</u> ,

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COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Ethanoic acid (acetic acid); C <sub>2</sub> H <sub>4</sub> O <sub>2</sub> ; [64-19-7] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEAS Lloyd, M.; Wych J. Chem. Soc. <u>19</u>	SUREMENTS: erley, V.; Mon <u>51</u> , 1786-9.	k, C.B.	
VARIABLES: Concentrations of NaOH and T/K = 298	1 acetic acid	PREPARED BY: H. Miyamoto			<u> </u>
EXPERIMENTAL DATA:			· /////	· · · · · · · · · · · · · · · · · · ·	
acetic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> K <sub>d</sub> ª	
0.0 0.01863 0.1382 0.1533	0.0 0.01119 0.03256 0.04452	0.00333 0.00442 0.00589 0.00654	4.5 4.0 4.2	5.8 5.6 5.6	
<sup>a</sup> For complete descriptions of see the compilation of the p	of computation of equilil aper by these authors on	orium constants and fo the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-(	r all AUXILIA CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O sy	ARY INFORMATIO stem.	N,

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Propanoic acid (propionic acid); C <sub>3</sub> H <sub>6</sub> O <sub>2</sub> ; [79-09-4] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEAS         Lloyd, M.; Wych         4]         J. Chem. Soc. 19	SUREMENTS: erley, V.; Mon 251, 1786-9.	k, C.B.
VARIABLES: Concentrations of NaOH and T/K = 298	propanoic acid	PREPARED BY: H. Miyamoto		
EXPERIMENTAL DATA:		I		
propanoic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> K d <sup>a</sup>
0.0	0.0	0.00333		
0.08385 0.1288	0.02727 0.02998	0.00552 0.00571	4.8 4.5 4.2	6.1 5.9
<sup>a</sup> For complete descriptions o see the compilation of the pa	f computation of equilib per by these authors on	rium constants and fo the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-(	r all AUXILIA CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O sy	NRY INFORMATION, stem.

Copper (II) lodate

	······································	T			
COMPONENTS:	:		ORIGINAL MEASUREMENTS:		
(1) Copper iodat	te: Cu(IO <sub>2</sub> ) <sub>2</sub> : [13454-89-2]		Das. A.R.: N	Jair, V.S.K.	
(2) Sadium hude	$r_{12} = r_{12} = r$				
(2) Soaium nyar	oxide; NaOH; [1310-73-2]		X X X I CI 1075 27 001 2		
(3) Hydroxyetha	noic acid (hydroxyacetic a	icid; glycolic	J. Inorg. Nu	cl. Chem. <u>1975</u> , 37, 991-3.	
acid); C <sub>2</sub> H <sub>4</sub> O	D <sub>3</sub> ; [79-14-1]			i i i i i i i i i i i i i i i i i i i	
(4) Water: H <sub>0</sub> O:	[7732-18-5]				
(.,,,,	[				
VARIABLES:			PREPARED	BY:	
Concentrations of	of NaOH and C <sub>2</sub> H <sub>4</sub> O <sub>3</sub>				
T/K = 298, 303	, 308, 313 and 318		H. Miyamo	to and E.M. Woolley	
-,,,			•	•	
	······				
EXPERIMENTA	L VALUES:				
C.	H.O. total conce	Cu(IOa)a s	olubility	- log K	
				- iog Kd	
t/"C	mol am-s	moi an	1-2		
25	0.008871	0.005	931	3.08	
	0.010390	0.006	368	311	
	0.011925	0.000	570	2.09	
	0.011825	0.000	575	3.08	
	0.014785	0.007	322	3.11	
	0.017741	0.008	018	3.13	
	0.021025	0.008	587	3.11	
	0.027175	0.000	157	2 11	
	0.027175	0.009	437	5.11	
				average: $3.10 \pm 0.05$	
30	0.004115	0.004	988	3.16	
	0.007983	0.006	181	3 17	
	0.010050	0.000	007	3.14	
	0.019950	0.008	021	5.14	
	0.023948	0.009	673	3.16	
	0.027940	0.010	407	3.17	
	0.031930	0.011	052	3.18	
				average: $3.16 \pm 0.03$	
Note that in eac	ch solution. [NaOH] = 1/	2[CoH2Oo]		continued	
		-1-2-4-3101			
	A	UXILIARY IN	FORMATIO	NN	
	••			• •	
METHOD/APP	ARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERIALS:	
Saturating colur prepd by dilution before and after least 4 times (two pH of all slns w $pK_{a}$ of $C_{2}H_{4}O_{3}$	nn method used as in (1). on of a stock sln, and the p r equilibration through the vice was sufficient for satu vere in the range of 3.6 to at 298 K = $3.80$ .	All sins off measured column at ration). The 3.8, and the	Cu(IO <sub>3</sub> ) <sub>2</sub> pr whenever p vacuum drie water so as	epd as in (3). AnalaR chemicals used ossible. Sodium glycollate slns prepd from ed, recrystd, sublimed acid and $CO_2$ -free to obtain a 1:1 buffer ratio (details in (3)).	
Sins analyzed for nitrogen atmos. constant was cal	or iodate by iodometric titr The thermodynamic solub lcd from	n in a lity product	ESTIMATE Soly: nothin Temp: preci	D ERROR: g specified. ision ± 0.1 K (see ref. (3)).	
K.	$_{0} = [Cu^{2+}][IO_{3}^{-}]^{2}y_{1}y_{2}$		REFERENC	CES:	
where activity of the modified Da pair included in assumed to be o	coefficients $y_1$ and $y_2$ were avies eqn (2). $K_d$ for the ( a the calculations, and $K_d(l)$ constant at 3.0 mol dm <sup>-3</sup> at	calcd from CuIO <sub>3</sub> - ion NaIO <sub>3</sub> ) 298 K.	<ol> <li>(1) Davies,</li> <li>(2) Davies,</li> <li>don, <u>1960</u>.</li> <li>(3) Ghosh,</li> <li><u>1970</u>, 32, 30</li> </ol>	C.W. J. Chem. Soc. <u>1930</u> , 2471. C.W. Ion Association. Butterworths, Lon- R.; Nair, V.S.K. J. Inorg. Nucl. Chem. 025.	
			L		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Das, A.R.; Nair, V.S.K.
(2) Sodium hydroxide; NaOH; [1310-73-2]	
(3) Hydroxyethanoic acid (hydroxyacetic acid; glycolic	J. Inorg. Nucl. Chem. <u>1975</u> , 37, 991-3
acid); C <sub>2</sub> H <sub>4</sub> O <sub>3</sub> ; [79-14-1]	
(4) Water; $H_2O$ ; [7732-18-5]	

EXPERIMENTAL	VALUES:	(continued)
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	$C_2H_4O_3$ total concn	Cu(IO <sub>3</sub> ) <sub>2</sub> solubility	- log K <sub>d</sub>	
t/ºC	mol dm-3	mol dm-3		
35	0.007983	0.006552	3.24	
	0.011800	0.007558	3.20	,
	0.011974	0.007674	3.22	
	0.014801	0.008421	3.22	
	0.024900	0.010456	3.20	
	0.029050	0.011237	3.21	
	0.033200	0.012120	3.24	
			average: $3.22 \pm 0.02$	
40	0.004306	0.005578	3.35	
	0.020810	0.010488	3.31	
	0.024952	0.011368	3.31	
	0.029095	0.012287	3.31	
	0.033245	0.013296	3.33	
			average: $3.32 \pm 0.03$	
45	0.004300	0.006137	3.37	
	0.010500	0.008540	3.37	
	0.020550	0.011850	3.39	
	0.024810	0.012750	3.36	
	0.029050	0.013730	3.36	
	0.033070	0.014650	3.36	
			average: 3.37 + 0.02	

Values of  $K_d$  were calculated from eq. [1] below, and activity coefficients were calculated from the modified Davies equation (2).

 $K_{d} \approx [Cu^{2+}]y_{2}[C_{2}H_{3}O_{3}^{-}]y_{1}/[Cu(C_{2}H_{3}O_{3})^{+}]y_{1}$ [1]

The authors state that plots of  $log K_d$  vs 1/T(K) are linear, and from these plots they calculate the following thermodynamic quantities for ion association at 298 K:

∆G/kcal mol <sup>-1</sup>	∆H/kcal mol-1	∆S/cal K <sup>-1</sup> mol <sup>-1</sup>
17.69 ± 0.03	$-24.52 \pm 0.04$	-141.59 ± 0.08

For the thermodynamic solubility product, the authors give the following values:

t/ºC	25	30	35	40	45
- log K <sub>s0</sub>	7.05	6.98	6.93	6.89	6.75

From the above  $K_{s0}$  data, the compilers estimate (for 298 K) that  $\Delta H = 6.0$  kcal mol<sup>-1</sup> and  $\Delta S = -12$  cal K<sup>-1</sup> mol<sup>-1</sup>. However, using the  $K_{s0}$  data for the first four temperatures which are <u>identical</u> to those given in ref. (3), the compilers estimate that  $\Delta = 4.5$  kcal mol<sup>-1</sup> and  $\Delta S = -17$  cal K<sup>-1</sup> mol<sup>-1</sup> at 298 K (see the compilation for ref. (3)).

Copper (II) Iodate

COMPONENTS:			ORIGINAL MEASUREMENTS:			
(1) Cop	per iodate: Cu(IO <sub>3</sub> ) <sub>2</sub> : []	3454-89-2]	Das, A.R.; Nair, V.S.K.			
<ul> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) DL-Hydroxysuccinic acid (DL-malic acid); C4HeOs;</li> </ul>		J. Inorg. Nucl. Chem. 1975. 37, 2121-3.				
					1691	(6915-15-7)
(4) Wate	er; H <sub>2</sub> O; [7732-18-5]					
VARIA	BLES:		PREPARED I	BY:		
Concen	trations of NaOH and C	<sub>4</sub> H <sub>6</sub> O <sub>5</sub>				
T/K = 1	298, 303, and 318		H. Miyamoto	and E.M. Woolley		
EXPER	IMENTAL VALUES:		_L			
	C₄HeOs total concn	Cu(IO <sub>3</sub> ) <sub>2</sub> solv	- log Kan	- log Kd2	- log K <sup>80</sup>	
t/⁰C	mol dm-3	mol dm-3				
25	0	0.003533			7.048	
	0.03107	0.010699	4.49			
	0.03604	0.011590	4.52			
	0.04101	0.012420	4.43	2.41		
	0.04605	0.013264	4.54	2.45		
	0.05095	0.013855	4 55	2.15		
	0.05593	0.013653	4.55	2.45		
	0.03333	0.014005	4.50	2.40		
		avere	$\pm 0.0$	$2.44 \pm 0.02$		
30	0	0.003764			6 929a	
50	0 03356	0.012376	4.61		0.525	
	0.03350	0.012570	4.64			
	0.04115	0.015079	4.04	2 50		
	0.04671	0.015078	4.05	2.30		
	0.05908	0.010107	4.05	2.49		
	0.00714	0.01/129	4.05	2.51		
		avera	iges. 4.04 <u>+</u> 0.0	2 2.50 <u>+</u> 0.05		
Note th	at in each solution, [Na	$OH]_{tot} = 1/2[C_4H_6O_5]_{tot}$		с	ontinued	
		AUXILIARY	INFORMATION	1		
метн	OD/APPARATUS/PRO	CEDURE:	SOURCE AN	D PURITY OF MA	TERIALS:	
Saturati	ing column method used	l as in (1). All slns	Cu(IO <sub>3</sub> ) <sub>2</sub> prep	pd as in (3). Anala	R chemicals used	
prepd t	by dilution of a stock sli	n, and the pH measured	whenever pos	ssible. Sodium mala	ate sins prepd from	
before	and after equilibration	through the column at	vacuum dried and recrystd acid, and CO <sub>2</sub> -free water s			
least 4	times (twice was suffici	ent for saturation).	as to obtain a 1:1 buffer ratio (details in (3)).			
Sins and	alyzed for iodate by iod	ometric titrn in a	ESTIMATED	ERROR:		
nitroge	n atmos. The thermody	namic solublity product	Solv: nothing specified.			
constan	t was caled from	······································	Temp: precision $+ 0.1$ K (see ref. (3)).			
	$K_{40} = [Cu^{2+}][IO$	e <sup>-</sup> ] <sup>2</sup> V1V2	REFERENCES:			
		U 4 7 17 2				
where a	activity coefficients y <sub>1</sub> a	and y <sub>2</sub> were calcd from	(1) Davies, C	.W. J. Chem. Soc.	<u>1930,</u> 2471.	
the mod	dified Davies eqn (2). I	K <sub>d</sub> for the CuIO <sub>3</sub> - ion	(2) Davies, C	W. Ion Association	. Butterworths, Lon-	
pair inc	cluded in the calculation	s, and K <sub>d</sub> (NaIO <sub>3</sub> )	don, <u>1960</u> .			
assume	d to be constant at 3.0 r	nol dm-3 at 298 K.	(3) Ghosh, R	.; Nair, V.S.K. J. I	norg. Nucl. Chem.	
			<u>1970</u> , <b>32</b> , 302	25.		

COMPONENTS: ORIGINAL MEASUREMENTS:						
(1) Cor	oper iodate; Cu(I	O <sub>3</sub> ) <sub>2</sub> ; [13454-89-2	[] Das, A.R.; Nair, V.S.K.			
(2) Sod	ium hydroxide; l	NaOH; [1310-73-2]	1			
(3) DL	-Hydroxysuccini	c acid (DL-malic a	acid); $C_4H_6O_5$ ;	J. Inorg. Nucl. Chem. <u>1975</u> , 37, 2121-3.		
[691	15-15-7]					
(4) Wat	ter; H <sub>2</sub> O; [7732-1	.8-5]				
EXPER	RIMENTAL VAL	UES:				
	$C_4H_6O_5$ total co	ncn Cu(IO	3)2 soly -	log K <sub>d1</sub>	- log K <sub>d2</sub>	- log K <sub>s0</sub>
t/ºC	mol dm-3	mol	dm-3			
45	0	0.0	04633			6.754ª
ļ	0.02599	0.0	15470	5.01 <sup>b</sup>		
	0.03355	0.0	17732	5.02		
[	0.04113	0.0	20114	5.04	2.85	
	0.04871	0.0	21869	5.05	2.83	
	0.05629	0.0	23543	5.05	2.83	
			averages	: 4.53 ± 0.03	3 2.44 ± 0.02	
*These	values differ fro	om the more accur	ate values repo	rted earlier (	e.g. see the compilation	of ref. (3) in this
volume	e).					
<sup>b</sup> In the	original article.	a value of 6.01 wa	as given which	is apparently	y a typographical error.	
	υ,		•			
K <sub>d1</sub> an	d Kd2 calculated	from eqs. [1] and	[2] using using	g activity coe	fficients calculated from	m a modified Davies
equatio	on (2). The there	modynamic equilib	rium constants	are defined	as follows:	
		$K_{d1} = [Cu^{2+}]y_2$	[C₄H₅O₅-]y₁/[C	u(C4H5O5+)]	y <sub>1</sub> [1]	
		$K_{d2} = [Cu^{2+}]y_2$	[C4H4O5 <sup>2-</sup> ]y1/[	Cu(C4H4O5)]	[2]	
The au	thors state that p	plots of <i>log</i> K <sub>d</sub> are	not linear, an	d the thermo	dynamic quantities wer	e therefore
Calcula	ited from the sin	bothing equation				
		ln K <sub>d</sub> = a	+ b(T/K) + c(	Г/К)²	[3]	
From t	the smoothing eq	uations, the follow	ing results we	re obtained.		
ļ	reaction	AG/keel mol-1	AH/kaal ma	1-1 AS/00	1 K -1 mol-1	
	f11	13 03 + 0.02	_36.08 + 0.0	) _170	171 + 03	
1	[1]	$13.93 \pm 0.06$ 25.89 ± 0.06	$-30.96 \pm 0.0$	-240		
	[~]	20.07 2 0.00		. 240		
From a	a plot of <i>log</i> K	vs 1/T, the comp	ilers obtain (fo	r 298 K) ΔH	$I = 6$ kcal mol <sup>-1</sup> and $\Delta S$	S = -12 cal K <sup>-1</sup>
mol-1	These results di	ffer from those p	eviously calcu	lated by the	compilers from the data	reported in earlier
studies	s (e.g. see the cor	npilations of ref. (	3) in this volu	me).		
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COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> (2) Sodium hydroxide; NaOI	ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.			
<ul> <li>(3) Trimethylacetic acid (pivalic acid); C<sub>5</sub>H<sub>10</sub>O<sub>2</sub>;</li> <li>[75-98-9]</li> </ul>				
(4) water; $H_2O$ ; [//32-18-5]				
VARIABLES:		PREPARED BY:		
Concentrations of NaOH and pivalic acid $T/K = 298$		H. Miyamoto		
EXPERIMENTAL DATA:				
pivalic acid concn	NaOH concn	solubility		
mol dm- <sup>3</sup>	mol dm-3	mol dm-3	pH	$10^{3}K_{d^{a}}$
0.0	0.0	0.00333		
0.04802	0.01006	0.00425	4.3	6.7
0.09603	0.02012	0.00498	4.3	6.6
0.1230	0.02580	0.00536	4.3	6.3
<sup>a</sup> For complete descriptions of see the compilation of the p	of computation of equili aper by these authors fo	brium constants and fo r the Cu(IO3)2-NaOH-	or all AUXILI. CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	ARY INFORMATION, ystem.

<ul> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) Phenylethanoic acid (phenylacetic acid); C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>; [103-82-2]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH and	phenylacetic acid	PREPARED BY:				
I/K = 298		H. Miyamoto		**************************************		
phenylacetic acid concn	NaOH concn	solubility				
mol dm-3	mol dm-3	mol dm-3	pН	$10^{2}K_{d^{B}}$		
0.0	0.0	0.00333	* * *			
0.02350	0.01039	0.00407	4.2	1.08		
0.02937	0.01290	0.00423	4.1	1.05		
0.01100	0.01948	0.00460	4.2	1.05		

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COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; (2) Sodium hydroxide; NaOH (3) 2-Methylpropanoic acid ( [79-31-2] (4) Water: HaO: [7732-18-5]	ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH and <i>iso</i> -butyric acid T/K = 298		PREPARED BY: H. Miyamoto			
EXPERIMENTAL DATA: <i>iso</i> -butyric acid concn mol dm <sup>-3</sup>	N2OH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	рН	10 <sup>3</sup> K <sub>d</sub> ª	
0.0 0.03133 0.06266 0.09399 * For complete descriptions o see the compilation of the pa	0.0 0.01113 0.01899 0.02890 f computation of equilibriu per by these authors for th	0.00333 0.00436 0.00486 0.00548 m constants and fo e Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	4.4 4.3 4.3 or all AUXILIA CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	6.4 6.9 6.7 ARY INFORMATION ystem.	

<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) Pentanoic acid (n-valeric acid); C<sub>5</sub>H<sub>10</sub>O<sub>2</sub>; [109-52-4]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH and n-valeric acid T/K = 298		PREPARED BY: H. Miyamoto				
EXPERIMENTAL DATA:		<b>I</b>				
n-valeric acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> K <sub>d</sub> ª		
0.0	0.0	0.00333				
0.06160ь	0.01672	0.00465	4.0	7.6		
0.05380 0.1232	0.02273 0.03344	0.00560	4.6 4.5	7.5 7.5		
<sup>a</sup> For complete descriptions of see the compilation of the pa <sup>b</sup> This data point appears to 1	of computation of equilinate aper by these authors for be in error (compiler).	brium constants and fo r the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	or all AUXILIA CH2O2-H2O S	ARY INFORMATION ystem.	Ν,	

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Hexanoic acid (caproic acid); C <sub>6</sub> H <sub>12</sub> O <sub>2</sub> ; [142-62-1] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH and T/K = 298	caproic acid	PREPARED BY: H. Miyamoto				
EXPERIMENTAL DATA:		<u></u>				
caproic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> K <sub>d</sub> a		
0.0 0.0350 0.0400	0.0 0.00795 0.01033	0.00333 0.00398 0.00413	4.5 4.1	8.7 9.2		
• For complete descriptions of the particular termination of termi	of computation of equilibring oper by these authors for t	ium constants and fo he Cu(IO <sub>3</sub> )2-NaOH-	r all AUXILIA CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	ARY INFORMATION, ystem.		

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Hydroxyethanoic acid (glycolic acid); C <sub>2</sub> H <sub>4</sub> O <sub>3</sub> ; [79-14-1] (4) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentrations of NaOH and glycolic acid T/K = 298		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
		PREPARED BY: H. Miyamoto				
EXPERIMENTAL DATA:			<u></u>			
glycolic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> Kd <sup>a</sup>		
0.0	0.0	0.00333				
0.01367	0.01311	0.00596	4.4	1.3		
0.01823	0.01719	0.00665	4.6	1.3		
0.02278	0.02216	0.00755	4.6	1.1		
<sup>a</sup> For complete descriptions see the compilation of the p	of computation of equilit aper by these authors for	prium constants and for the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	or all AUXILL CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	ARY INFORMATI ystem.	ION,	

<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) DL-2-Hydroxypropanoic acid (DL-lactic acid); C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>; [598-82-3]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.			
VARIABLES: Concentrations of NaOH and $DL$ -lactic acid T/K = 298		PREPARED BY: H. Miyamoto			
EXPERIMENTAL DATA:				<u></u>	
DL-lactic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>3</sup> K <sub>d</sub> ª	
0.0 0.00717 0.01090 0.01433	0.0 0.00624 0.00949 0.01356	0.00333 0.00475 0.00542 0.00636	4.4 4.3 5.0	1.3 1.2 1.0	
• For complete descriptions o see the compilation of the pa	f computation of equilib per by these authors for	rium constants and fo the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	r all AUXILIA CH2O2-H2O s	ARY INFORMATIO ystem.	N,

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COMPONENTS:		ORIGINAL MEASUREMENTS:			
<ul> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide: NaOH: [1310-73-2]</li> </ul>		Lloyd, M.; Wycherley, V.; Monk, C.B.			
[79-11-8]					
(4) Water; H <sub>2</sub> O; [7732-18-5]		}			
VARIABLES:		PREPARED BY:			
Concentrations of NaOH and ch	loroacetic acid	H Miramata			
1/K = 298		H. Miyamoto			
EXPERIMENTAL DATA:		_I			
chloroacetic acid concn	NaOH concn	solubility			
mol dm-3	mol dm <sup>-3</sup>	mol dm-3	pH	$10^{2}K_{d^{B}}$	
0.0	0.0	0.00333			
0.03977	0.03767	0.00475	4.0	2.64	
0.07008	0.06711	0.00551	4.0	2.40	
0.08872	0.08728	0.00604	4.0	2.25	
<sup>a</sup> For complete descriptions of c	omputation of equilibrit	im constants and fo	or all AUXILIA	ARY INFORMATION	١,
see the compilation of the paper	by these authors for th	$e Cu(IO_3)_2$ -NaOH-	$CH_2O_2-H_2O_3$	ystem.	

COMPONENTS:		ORIGINAL MEAS	ORIGINAL MEASUREMENTS:		
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]		Lloyd, M.; Wycherley, V.; Monk, C.B.			
(2) Sodium hydroxide; NaOl	(2) Sodium hydroxide: NaOH: [1310-73-2]				
(3) Trichloroethanoic acid (1	richloracetic acid);	J. Chem. Soc. 19	9 <u>51</u> , 1786-9.		
C <sub>2</sub> HCl <sub>3</sub> O <sub>2</sub> ; [76-03-9]		_			
(4) Water; H <sub>2</sub> O; [7732-18-5]					
VARIABLES:		PREPARED BY:			
Concns of NaOH and trichle	proacetic acid				
T/K = 298		H. Miyamoto			
EXPERIMENTAL DATA:		l			
C <sub>2</sub> HCl <sub>3</sub> O <sub>2</sub> concn	NaOH concn	solubility			
mol dm-3	mol dm-3	mol dm-3	pH	$10^{2}K_{d^{B}}$	
0.0	0.0	0.00333			
0.01358	0.01266	0.00394	3.7	2.41	
0.02716	0.02577	0.00442	3.9	2.34	
0.02927	0.02954	0.00445	4.2	2.81	
• For complete descriptions	of computation of equili	brium constants and fo	or all AUXILIA	ARY INFORMATIC	)N,
see the compilation of the p	aper by these authors fo	r the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	$CH_2O_2-H_2O$ s	ystem.	
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<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) Bromoethanoic acid (bromoacetic acid); C<sub>2</sub>H<sub>3</sub>BrO<sub>2</sub>; [79-08-3]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH and T/K = 298	bromoacetic acid	PREPARED BY: H. Miyamoto				
EXPERIMENTAL DATA:		<u></u>				
bromoacetic acid concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	10 <sup>2</sup> Kd <sup>a</sup>		
0.0 0.05475 0.06958 0.08974	0.0 0.05201 0.06692 0.08728	0.00333 0.00507 0.00553 0.00599	4.5 4.1 4.6	2.85 2.45 2.35		
• For complete descriptions of see the compilation of the pap	computation of equilibring our by these authors for the	um constants and fo ne Cu(IO <sub>3</sub> )2-N2OH-	r all AUXILIA CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	ARY INFORMATION, ystem.		

<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) 2-Bromobutanoic acid (α-bromobutyric acid); C<sub>4</sub>H<sub>7</sub>BrO<sub>2</sub>; [80-58-0]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B.			
		J. Chem. Soc. <u>1951</u> , 1786-9.			
VARIABLES:	mobuturic scid	PREPARED BY:			
T/K = 298	nobulyne acia	H. Miyamoto			
EXPERIMENTAL DATA:		<u></u>			
C <sub>4</sub> H <sub>7</sub> BrO <sub>2</sub> concn	NaOH concn	solubility			
mol dm-3	mol dm-3	mol dm-3	pH	10 <sup>2</sup> K <sub>d</sub> <sup>a</sup>	
0.0	0.0	0.00333			
0.01358	0.01266	0.00394	3.7	2.41	
0.02716	0.02577	0.00442	3.9	2.34	
0.02927	0.02954	0.00445	4.2	2.81	
<sup>a</sup> For complete descriptions of the p	of computation of equili aper by these authors fo	brium constants and fo r the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	or all AUXILI. CH2O2-H2O s	ARY INFORMATIC ystem.	DN,

<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) 3-Iodopropanoic acid (β-iodopropionic acid); C<sub>3</sub>H<sub>5</sub>IO<sub>2</sub>; [141-76-4]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>		ORIGINAL MEASUREMENTS: Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 1786-9.				
VARIABLES: Concentrations of NaOH ar T/K = 298	nd C <sub>3</sub> H <sub>5</sub> IO <sub>2</sub>	PREPARED BY: H. Miyamoto				
EXPERIMENTAL DATA:				<u></u>		
C <sub>3</sub> H <sub>5</sub> IO <sub>2</sub> concn mol dm <sup>-3</sup>	NaOH concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	$10^2 K_d^a$		
0.0	0.0	0.00333				
0.05320	0.02988	0.00495	4.2	1.23		
0.06385	0.03737	0.00527	4.1	1.22		
0.08512	0.04782	0.00566	4.2	1.20		
<sup>a</sup> For complete descriptions see the compilation of the	of computation of equili paper by these authors fo	brium constants and fo r the Cu(IO <sub>3</sub> ) <sub>2</sub> -NaOH-	or all AUXILL CH <sub>2</sub> O <sub>2</sub> -H <sub>2</sub> O s	ARY INFORMATI ystem.	ON,	

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	ORIGINAL MEASUREMENTS: Keefer, R.M.
(2) Glycine; C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ; [56-40-6]	J. Am. Chem. Soc. <u>1948</u> , 70, 476-9.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Concentration of H <sub>2</sub> NCH <sub>2</sub> CO <sub>2</sub> H	PREPARED BY:
T/K = 298	H. Miyamoto

The solubility of  $Cu(IO_3)_2$  in aqueous glycine solutions at 25°C was given as:

[C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ] mol kg <sup>-1</sup>	solubility mol kg-1	pHa
0.0	0.003245	
0.01253	0.004096	3.32
0.02509	0.004805	3.31
0.05023	0.00617	3.32 (3.35)
0.07542	0.00746	3.37
0.1008	0.00872	3.38
0.1515	0.01116	3.39
0.2025	0.01352	3.41

•Values in parenthesis stated to be "Cor. pH" which was not defined. Using the extended Debye-Huckel activity coefficient equation as in (1), the solubility-pH data were interpreted in terms of the following complex equilibria.

$C_2H_5NO_2 + Cu^{2+}$	= $Cu(C_2H_4NO_2)^+ + H^+$	$K_1 = 0.032$
$2C_{2}H_{5}NO_{2} + Cu^{2+}$	$= Cu(C_2H_4NO_2)_2 + 2H^+$	$K_2 = 2.8 \times 10^{-4}$
$C_2H_5NO_2 + Cu^{2+}$	$= Cu(C_2H_5NO_2)^{2+}$	$K_3 = 39 \text{ kg mol}^{-1}$ .

#### AUXILIARY INFORMATION

الساري بيشاقا المراجع المتحالي والتحالي والتحالي والتحالي والتحالي والمحالي والمحالي والمحالي والمحالي والتحالي والتحالي والمحالي و	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Method as in (1). Glycine solutions prepared from distilled water using calibrated volumetric apparatus. Excess air-dried copper iodate placed in glass-stopperd Pyrex flasks and the glycine solutions added. The flasks were placed in a thermostat at $25^{\circ}$ C and rotated for at least 12 h. By applying pressure, samples of saturated solution were removed with a pipet fitted with an asbestos filter. Solubilities were determined by iodometric titration modified for the presence of Cu <sup>2+</sup> using the method of Foote and Vance (2).	$Cu(IO_3)_2$ prepared by adding equal volumes of 0.2 mol kg <sup>-1</sup> KIO <sub>3</sub> and 0.1 mol kg <sup>-1</sup> CuSO <sub>4</sub> solutions to a large volume of water at 60°C. The ppt was filtered and stored under water overnight. The product was sedimented several times and the smaller particles were discarded. After drying for 2 h at 250-270°C, the dried copper iodate was analyzed iodometrically and the purity was found to equal 100.1 %.
	ESTIMATED ERROR: Soly: duplicates agreed to ± 0.2 %. Temp: precision ± 0.02 K.
	REFERENCES: (1) Keefer, R.M.; Reiber, H.G.; Bisson, C.S. J. Am. Chem. Soc. <u>1940</u> , 62, 2951. (2) Foote, H.W.; Vance, J.E. Ind. Eng. Chem. Anal.
	Ed. <u>1936</u> , 8, 119.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	ORIGINAL MEASUREMENTS: Keefer, R.M.
(2) <i>DL</i> -Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ; [302-72-7]	J. Am. Chem. Soc. <u>1948</u> , 70, 476-9.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Concentration of $CH_3CH(NH_2)CO_2H$ T/K = 298	PREPARED BY: H. Miyamoto

The solubility of  $Cu(IO_3)_2$  in aqueous alanine solutions at 25°C was given as:

[C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ]	solubility	
mol kg-1	mol kg <sup>-1</sup>	pHa
0.0	0.003245	
0.01252	0.00398	3.40
0.02508	0.00460	3.37
0.05019	0.00584	3.40 (3.405)
0.07541	0.00698	3.42 (3.43)
0.1008	0.00806	3.44
0.1516	0.01022	3.48 (3.47)
0.2027	0.01230	3.49

<sup>a</sup>Values in parentheses are "Cor. pH" values, but the term Cor. pH was not defined. Using the extended Debye-Huckel equation to compute activity coefficients, the author interpreted the solubility data in terms of the following complex equilibria.

$C_3H_7NO_2 + Cu^{2+}$	=	$Cu(C_3H_6NO_2)^+ + H^+$	$K_1 = 0.034$
$2C_3H_7NO_2 + Cu^{2+}$	82	$Cu(C_{3}H_{6}NO_{2})_{2} + 2H^{+}$	$K_2 = 1.07 \times 10^{-4}$
$C_3H_7NO_2 + Cu^{2+}$	=	$Cu(C_3H_7NO_2)^{2+}$	$K_3 = 29 \text{ kg mol}^{-1}$ .

#### AUXILIARY INFORMATION

#### METHOD/APPARATUS/PROCEDURE:

Method as in (1). Alanine solutions prepared from distilled water using calibrated volumetric apparatus. Excess air-dried copper iodate placed in glass-stopperd Pyrex flasks and the alanine solutions added. The flasks were placed in a thermostat at  $25^{\circ}$ C and rotated for at least 12 h. By applying pressure, samples of saturated solution were removed with a pipet fitted with an asbestos filter. Solubilities were determined by iodometric titration modified for the presence of Cu<sup>2+</sup> using the method of Foote and Vance (2).

### SOURCE AND PURITY OF MATERIALS:

Cu(IO<sub>3</sub>)<sub>2</sub> prepared by adding equal volumes of 0.2 mol kg<sup>-1</sup> KIO<sub>3</sub> and 0.1 mol kg<sup>-1</sup> CuSO<sub>4</sub> solutions to a large volume of water at 60°C. The ppt was filtered and stored under water overnight. The product was sedimented several times and the smaller particles were discarded. After drying for 2 h at 250-270°C, the dried copper iodate was analyzed iodometrically and the purity was found to equal 100.1 %.

ESTIMATED ERROR: Soly: duplicates agreed to  $\pm$  0.2 %. Temp: precision  $\pm$  0.02 K.

REFERENCES: (1) Keefer, R.M.; Reiber, H.G.; Bisson, C.S. J. Am. Chem. Soc. <u>1940</u>, 62, 2951.

(2) Foote, H.W.; Vance, J.E. Ind. Eng. Chem. Anal. Ed. <u>1936</u>, 8, 119.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Hydrogen chloride; HCl; [7647-01-0] (3) Glycine; C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ; [56-40-6]		ORIGINAL MEAS Monk, C.B. Trans. Faraday S	ORIGINAL MEASUREMENTS: Monk, C.B. Trans, Faraday Soc. 1951, 47, 285-91.			
(4) Water; H <sub>2</sub> O; [7732-18-5	]					
VARIABLES:		PREPARED BY:				
Concns of HCl and glycine T/K = 298		H. Miyamoto and	i E.M. Woolley	,		
EXPERIMENTAL DATA:	The solubility of Cu(IO <sub>3</sub> )	2 in aqueous HCl-glyc	ine solutions a	t 25ºC.		
HCI concn	glycine concn	solubility		10 <sup>9</sup> Kd <sup>a</sup>		
mol dm-3	mol dm <sup>-3</sup>	mol dm-3	pH	mol dm-3		
0.0	0.0	0.00333				
0.00122	0.01971	0.00434	3.125	2.20		
0.00081	0.01971	0.00439	3.20	2.20		
0.0	0.01971	0.00450	3.29	2.44		
<sup>a</sup> The dissociation constant HIO <sub>3</sub> , CuCl <sup>+</sup> , CuIO <sub>3</sub> <sup>+</sup> , and well as for all AUXILIARY this author as well as in oth	for CuC <sub>2</sub> H <sub>4</sub> NO <sub>2</sub> + calculat for acid/base dissociation INFORMATION are given ther compilations based on	ed using literature values of $C_2H_5N_0^{-1}$ of constants for $C_2H_5N_0^{-1}$ where in the compilation of this author's publication	tes for the diss $D_2$ . Details on for the Cu( $IO_3$ tons.	ociation constants of these calculations as ) <sub>2</sub> -KCl-H <sub>2</sub> O system by		

OMPONENTS:		ORIG	INAL MEASU	REMENTS:		
<ol> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium Hydroxide; NaOH; [1310-73-2]</li> </ol>			Monk, C.B.			
(3) Glycine; C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ; [56-40-6]		Trans	Trans. Faraday Soc. <u>1951</u> , 47, 285-91.			
(4) Water; H <sub>2</sub> O; [77	32-18-5]					
VARIABLES:		PREP	ARED BY:			
Concns of NaOH a	nd glycine					
1/K = 298		H. M	iyamoto and E	M. wooney		
EVDEDIMENTAL	DATA: The solubility	of Cu(IO <sub>3</sub> ), in aqueou	s NaOH-glyci	ne solutions at 2	25ºC.	
CALERIMENTAL I	•					
NaOH concn	glycine concn	solubility		10 <sup>9</sup> K <sub>d1</sub> *	107K <sub>d2</sub> a	
NaOH concn mol dm <sup>-3</sup>	glycine concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	рН	10 <sup>9</sup> K <sub>d1</sub> * mol dm- <sup>3</sup>	10 <sup>7</sup> K <sub>d2<sup>a</sup></sub> mol <sup>2</sup> dm <sup>-6</sup>	
NaOH concn mol dm <sup>-3</sup>	glycine concn mol dm <sup>-3</sup> 0.01971	solubility mol dm-3 0.00450	pH 3.29	10 <sup>9</sup> K <sub>d1</sub> ª mol dm- <sup>3</sup> 2.44	107K <sub>d2</sub> ª mol <sup>2</sup> dm <sup>-6</sup>	
NaOH concn mol dm- <sup>3</sup> 0.0 0.00659	glycine concn mol dm <sup>-3</sup> 0.01971 0.01288	solubility mol dm <sup>-3</sup> 0.00450 0.00676	pH 3.29 4.33	10 <sup>9</sup> K <sub>d1</sub> <sup>a</sup> mol dm <sup>-3</sup> 2.44 2.53	107K <sub>d2</sub> * mol <sup>2</sup> dm <sup>-6</sup>  1.16	
NaOH concn mol dm <sup>-3</sup> 0.0 0.00659 0.00701	glycine concn mol dm <sup>-3</sup> 0.01971 0.01288 0.01209	solubility mol dm <sup>-3</sup> 0.00450 0.00676 0.00694	pH 3.29 4.33 4.45	10 <sup>9</sup> K <sub>d1</sub> <sup>a</sup> mol dm <sup>-3</sup> 2.44 2.53 2.51	107K <sub>d2</sub> <sup>a</sup> mol <sup>2</sup> dm <sup>-6</sup>  1.16 1.04	
NaOH concn mol dm <sup>-3</sup> 0.0 0.00659 0.00701 0.00783	glycine concn mol dm <sup>-3</sup> 0.01971 0.01288 0.01209 0.01226	solubility mol dm <sup>-3</sup> 0.00450 0.00676 0.00694 0.00739	pH 3.29 4.33 4.45 4.585	10 <sup>9</sup> K <sub>d1</sub> <sup>a</sup> mol dm <sup>-3</sup> 2.44 2.53 2.51 2.56	107K <sub>d2</sub> <sup>a</sup> mol <sup>2</sup> dm <sup>-6</sup>  1.16 1.04 1.06	

 $K_{d1}$  for the dissociation of CuC<sub>2</sub>H<sub>4</sub>NO<sub>2</sub><sup>+</sup> to Cu<sup>2+</sup> and C<sub>2</sub>H<sub>4</sub>NO<sub>2</sub><sup>-</sup>, and K<sub>d2</sub> for the dissociation of  $Cu(C_2H_4NO_2)_2$  to  $Cu^{2+}$  and  $2C_2H_4NO_2^{-}$ . All other equilibrium constants taken from the literature. For details on these calculations and for other AUXILIARY INFORMATION, see previous compilations of this author's publications.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Hydrogen chloride; HCl; [7647-01-0] (3) <i>DL</i> -Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ; [302-72-7] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEAS Monk, C.B.	ORIGINAL MEASUREMENTS: Monk, C.B.			
		Trans. Faraday S	Trans. Faraday Soc. <u>1951</u> , 47, 285-91.			
VARIABLES:		PREPARED BY:				
Concns of HCl and $DL$ -alanine T/K = 298		H. Miyamoto and	H. Miyamoto and E.M. Woolley			
EXPERIMENTAL DATA:	The solubility of Cu(IO <sub>3</sub> )	) <sub>2</sub> in aqueous HCl-alan	ine solutions a	it 25°C.		
HCl concn	alanine concn	solubility		10 <sup>9</sup> K <sub>d</sub> <sup>a</sup>		
mol dm- <sup>3</sup>	mol dm- <sup>3</sup>	mol dm- <sup>3</sup>	pH	mol dm <sup>-3</sup>		
0.0	0.0	0.00333				
0.00344	0.01427	0.00374	2.96	3.19		
0.00203	0.01434	0.00382	3.09	3.11		
0.00122	0.01427	0.00390	3.19	3.00		
0.00041	0.01427	0.00397	3.28	3.18		
<sup>a</sup> The dissociation constant HIO <sub>3</sub> , CuCl <sup>+</sup> , CuIO <sub>3</sub> <sup>+</sup> , an well as for all AUXILIAR this author as well as in c	t for CuC <sub>3</sub> H <sub>6</sub> NO <sub>2</sub> + calculat d for acid/base dissociatior Y INFORMATION are giv other compilations based on	ed using literature values of $C_8H_7N_1$ of constants for $C_8H_7N_2$ where in the compilation this author's publication	ues for the dist $D_2$ . Details on for the Cu(IO) tons.	sociation constants of these calculations as 3)2-KCl-H2O system by		

COMPONENTS:			ORIGINAL MEASUREMENTS:			
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]			Monk, C.B.			
(2) Sodium Hydroxide; NaOH; [1310-73-2] (3) DL-Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ; [302-72-7]				•		
			Trans. Faraday Soc. <u>1951</u> , 47, 285-91.			
(4) Water; H <sub>2</sub> O; [77	32-18-5]					
			······································	···-		
VARIABLES:			PREPARED BY:			
Concess of NaOH a $T/K = 20^{\circ}$	Concess of NaOH and DL-alanine		H Minemote and E.M. Weeller			
1/1 = 298				E.W. WOULEY		
EXPERIMENTAL	DATA: The solubility	of Cu(IO <sub>3</sub> ) <sub>2</sub> in	aqueous NaOH-alar	ine solutions at	25ºC.	
NaOH concn	alanine concn	solubility	1	10 <sup>9</sup> K <sub>d1</sub> <sup>a</sup>	107K <sub>d2</sub> a	
mol dm-3	mol dm-3	mol dm	-3 pH	mol dm-3	mol² dm-6	
0.00616	0.01563	0.00653	4.29	3.27	1.31	
0.00750	0.01570	0.00726	4.47	3.06	1.34	
0.00750	0.01262	0.00727	4.68	3.06	1.47	
*K <sub>d1</sub> for the dissoc	iation of $CuC_3H_6NO_2^+$	to Cu <sup>2+</sup> and C	$_{3}H_{6}NO_{2}$ , and $K_{d2}$	for the dissociation	on of	
Cu(C <sub>3</sub> H <sub>6</sub> NO <sub>2</sub> ) <sub>2</sub> to C	$Cu^{2+}$ and $2C_{3}H_{6}NO_{2}^{-}$ .	All other equili	ibrium constants tak	en from the liter	ature. For details	
on these calculation	is and for other AUXII	LIARY INFORM	MATION, see previo	ous compilations	of this author's	

publications.

50			Cobher (i	i) iouale			
COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium hydroxido: NoOH: [1310-73-2]				ORIGINAL MEASUREMENTS: Ghosh, R.; Nair, V.S.K.			
(2) Sodium hydroxide; NaOH; $[1310-73-2]$ (3) Malonic acid; $C_3H_4O_4$ ; $[141-82-2]$ (4) Water; $H_2O$ ; $[7732-18-5]$			J. Inorg. Nucl. Chem. <u>1970</u> , 32, 3033-9.				
VARIA	BLES:		<u> </u>	PREPARED BY:	······································		
Concentrations of NaOH and $C_3H_4O_4$ T/K = 298, 303, and 308 and 318			H. Miyamoto and E.M. Woolley				
EXPERIMENTAL VALUES:							
	[C <sub>3</sub> H <sub>4</sub> O <sub>4</sub> ]	[NaOH]	Cu(IO <sub>3</sub> ) <sub>2</sub> soly			F	
t∕⁰C	mol dm-3	mol dm-3	mol dm-3	-log K <sub>d1</sub>	-log K <sub>d2</sub>	-log K <sub>s0</sub>	
25	0.0	0.0	0.003533			7.048	
	0.013887	0.006967	0.004132	5.07			
	0.027773	0.013934	0.004951	5.10			
	0.034716	0.017403	0.005406	5.09	0.91		
	0.041659	0.020870	0.005822	5 10	0.90		
	0.055545	0.027808	0.006664	5.10	0.90		
	0.0505.15	0.017800	0.000004 9.000004	5.09 ± 0.02			
			averages.	5.09 <u>+</u> 0.02	$0.90 \pm 0.01$		
30	0.0	0.0	0.003764			6.980	
	0.013887	0.006967	0.004829	5.15			
	0.027773	0.013934	0.005515	5.15			
	0.034716	0.017403	0.006004	5.14	0.98	1	
	0.041659	0.020870	0.006060	5.14	0.98		
	0.055545	0.027808	0.006941	5.14	0.99		
	0.041659	0.031527	0.008093	5.14	0.02		
		0.001027	averages:	$5.14 \pm 0.01$	$0.98 \pm 0.01$		
Note th	at in each solu	tion, [NaOH] <sub>tot</sub>	$= 1/2[C_3H_4O_4]_{tot}$		continued		
			AUXILIARY IN	FORMATION			
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:							
<b>a</b>			/··· · ·				
Saturati	ng column me	thod used as in	(1). All sins	$Cu(IO_3)_2$ prepared by dropwise addition of KIO <sub>3</sub> and $Cu(IO_3)_2$			
prepd b	by dilution of	a stock sln, and	the pH measured	CuCl <sub>2</sub> solutions into a large volume of dist water at			
before a	and after equi	libration throug	h the column at	65°C with stirring for 2 h. The ppt was washed 6			
least 4 1	times (twice w	as sufficient for	r saturation). The	times and digested in double dist water for 4 h at 80°C.			
pH of a	ill slns were in	the range of 3.	.7 to 3.8.	AnalaR chemicals were used wherever possible. Sodi-			
Sins ana	alyzed for ioda	ite by iodometri	c titrn in a	um malonate solutions prepd from the acid and			
nitroger	n atmos. The	thermodynamic	solublity product	CO <sub>2</sub> -free NaOH solution so as to obtain a 1:1 buffer			
constant	t was caled fro	om		ratio. Conductivity water was prepared by mixed bed			
		deionization.					
$K_{s0} = [Cu^{2+}][IO_3^{-}]^2y_1y_2$			ECTIMATED EDI				
			ESTIMATED ERROR:				
where a	ctivity coeffic	tients $y_1$ and $y_2$	were calcd from	Soly: nothing spec	iffed. Average errors	$s$ in $K_d$ values	
the modified Davies eqn (2). $K_d$ for the CuIO <sub>3</sub> <sup>-</sup> ion pair included in the calculations. $K_d$ (NaIO <sub>3</sub> ) assumed to be 3.0 mol dm <sup>-3</sup> at 298 K, and values at higher			given in data	tables.			
			Temp: precision ±	0.1 K.			
			DEEEDENCEC.				
tempera	nures were est	imated.		KEFERENCES:		471	
			(1) Davies, C.W. J. Chem. Soc. <u>1930</u> , 2471.				
			(2) Davies, C.W. Ion Association. Butterworths,				
				London, <u>1960</u>		ļ	

Copper (II) locate					D	
COMPONENTS: (1) Copper iodate; $Cu(IO_3)_2$ ; [13454-89-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Malonic acid; $C_3H_4O_4$ ; [141-82-2] (4) Water; $H_2O$ ; [7732-18-5]				ORIGINAL MEAS Ghosh, R.; Nair, J. Inorg. Nucl. C	3-9.	
EXPER	RIMENTAL VA	LUES: (cont	inued)	,,,,,,,,		····
t/ºC	[C <sub>3</sub> H <sub>4</sub> O <sub>4</sub> ] mol dm <sup>-3</sup>	[NaOH] mol dm <sup>-3</sup>	Cu(IO <sub>3</sub> ) <sub>2</sub> soly mol dm <sup>-3</sup>	-log K <sub>d1</sub>	-log K <sub>d2</sub>	-log K <sub>s0</sub>
35	0.0	0.0	0.003956			6.929
	0.013887	0.006967	0.005063	5.19		•
	0.027773	0.013934	0.005964	5.19		
	0.034716	0.017403	0.006491	5.18	1.05	
	0.041659	0.020870	0.006881	5.18	1.05	
	0.055545	0.027808	0.007663	5.19	1.05	
			averages	: 5.19 ± 0.01	1.05	
40	0.0	0.0	0.004101			6.888
	0.013887	0.006967	0.005322	5.28		
	0.027773	0.013934	0.006366	5.28	1.13	
	0.034716	0.017403	0.006953	5.28	1.14	
	0.041659	0.020870	0.007362	5.28	1.14	
	0.055545	0.027808	0.008486	5.28	1.13	
	0.041659	0.031527	0.009663	5.28	1.13	

Values of  $K_{d1}$  and  $K_{d2}$  were calculated for reactions [1] and [2] using activity coefficients,  $y_1$  and  $y_2$  calculated from a modified Davies equation (2).

5.28

1.13 ± 0.01

averages:

 $K_{d1} = [Cu^{2+}]y_2[C_3H_2O_4^{2-}]y_1/[Cu(C_3H_2O_4)]$ [1]

$$K_{d2} = [Cu^{2+}]y_2[C_3H_3O_4]y_1/[Cu(C_3H_3O_4)]y_1$$
[2]

All  $K_d$  and  $K_{s0}$  values are based on mol dm<sup>-3</sup> concentration units. The authors fitted the  $K_d$  data to the smoothing equation

$$log K_d = a + b(T/K) + c(T/K)^2$$
 [3]

and the following thermodynamic parameters were obtained (for 298 K).

reaction  $\Delta G/kcal \mod^{-1} -\Delta H/kcal \mod^{-1} -\Delta S/cal K^{-1} \mod^{-1}$ 

[1]	6.95 ± 0.03	$3.50 \pm 0.03$	$35.0_5 \pm 0.5$
[2]	1.23 ± 0.01	$6.58 \pm 0.03$	$26.2 \pm 0.2$

From a plot of log K<sub>\$0</sub> vs 1/(T/K), the compilers estimate that  $\Delta H = 4.5$  kcal mol<sup>-1</sup> and  $\Delta S = -17$  cal mol<sup>-1</sup> K<sup>-1</sup> (for 298 K).

<ul> <li>COMPONENTS:</li> <li>(1) Copper iodate; Cu(IO<sub>3</sub>)<sub>2</sub>; [13454-89-2]</li> <li>(2) Sodium hydroxide; NaOH; [1310-73-2]</li> <li>(3) DL-2-Hydroxypropanoic acid (DL-lactic acid); C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>; [598-82-3]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>			ORIGINAL MEASUREMENTS: Ghosh, R.; Nair, V.S.K. J. Inorg. Nucl. Chem. <u>1970</u> , 32, 3025-32			
VARIA	BLES:		PREPARED E	BY:		
T/K =	298, 303, 308 and 318 $C_3$	H <sub>6</sub> O <sub>3</sub>	H. Miyamoto	and E.M. Woolley		
EXPERIMENTAL VALUES:				n an		
t/⁰C	C <sub>3</sub> H <sub>6</sub> O <sub>3</sub> total concn mol dm <sup>-3</sup>	Cu(IO <sub>3</sub> ) <sub>2</sub> soly mol dm <sup>-3</sup>	- log K <sub>d1</sub>	- log K <sub>d2</sub>	- <i>log</i> K <sub>s0</sub>	
25	0	0.003533			7 048	
2.5	0 002493	0.003854	2 33		7.040	
	0.004985	0.004122	2.29			
	0.009970	0.004728	2.31	1.56		
	0.02492	0.006523	2.40	1.54		
	0.03739	0.007727	2.39	1.53		
	0.04985	0.008933	2.41	1.51		
		avera	$\frac{1}{1000}$ ges: $4.36 + 0.07$	7 1.54 + 0.03		
30	0	0.003764			6.980	
	0.004980	0.004553	2.49			
	0.009960	0.005079	2.41			
	0.01494	0.005731	2.44	1.05		
	0.02490	0.006823	2.46	1.06		
	0.03735	0.008013	2.47	1.06		
	0.04980	0.009189	2.50	1.07		
		avera	132332323232323232323232323232323232323	5 1.06 ± 0.01		
			-	-		
Note th	nat in each solution, [Nac	$(H)_{tot} = 1/2[C_3H_6O_3]_{tot}$				
				continue	l	
		AUXILIARY	INFORMATION			
METH	OD/APPARATUS/PROC	EDURE:	SOURCE AN	D PURITY OF MAT	TERIALS:	
Saturating column method used as in (1). All slns prepd by dilution of a stock sln, and the pH measured before and after equilibration through the column at			Cu(IO <sub>3</sub> ) <sub>2</sub> prep CuCl <sub>2</sub> solution $65^{\circ}$ C with stin	Cu(IO <sub>3</sub> ) <sub>2</sub> prepared by dropwise addition of KIO <sub>3</sub> and CuCl <sub>2</sub> solutions into a large volume of dist water at $65^{\circ}$ C with stirring for 2 h. The ppt was washed 6		
least 4 times (twice was sufficient for saturation). The			times and dig	times and digested in double dist water for 4 h at 80°C.		
pH of all slns were in the range of 3.7 to 3.8.			AnalaR chemicals were used wherever possible. Sodi-			
Sins an	alyzed for iodate by iodo	metric titrn in a	um lactate sol	um lactate solutions prepd from the acid and CO <sub>2</sub> -free		
nitroge	n atmos. The thermodyn	amic solublity product	NaOH solutio	NaOH solution so as to obtain a 1:1 buffer ratio.		
constan	it was caled from		Conductivity	Conductivity water was prepared by mixed bed		
			deionization.	deionization.		
$K_{s0} = [Cu^{2+}][IO_{3}^{-}]^{2}y_{1}y_{2}$						
where activity coefficients $y_1$ and $y_2$ were calcd from			ESTIMATED	ERROR:		
			Soly: nothing	specified. Average	errors in K <sub>d</sub> values	
the mo	dified Davies eqn (2). K	d for the $CuIO_3$ - ion	given in	data tables.		
pair included in the calculations. K <sub>d</sub> (NaIO <sub>3</sub> ) assumed to be 3.0 mol dm <sup>-3</sup> at 298 K, and values at higher temperatures were estimated.			Temp: precisi	ion $\pm$ 0.1 K.		
					······································	
			REFERENCE	S:		
			(1) Davies, C	(1) Davies, C.W. J. Chem. Soc. <u>1930</u> , 2471.		
		(2) Davies, C.W. Ion Association. Butterworths,				
			London, 1	960.		

COMPONENTS:			ORIGINAL MEASUREMENTS:			
(1) Cor	oper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ;	[13454-89-2]	Ghosh, R.; N	air, V.S.K.		
(2) Sod	(2) Sodium hydroxide; NaOH; [1310-73-2]					
(3) DL-2-Hydroxypropanoic acid (DL-lactic acid);			J. Inorg. Nucl. Chem. <u>1970</u> , 32, 3025-32.			
C <sub>3</sub> H <sub>6</sub> O <sub>3</sub> ; [598-82-3]						
(4) Water; $H_2O$ ; [7732-18-5]			ļ			
EXPER	RIMENTAL VALUES:	(continued)				
(	C <sub>3</sub> H <sub>6</sub> O <sub>3</sub> total concn	Cu(IO <sub>3</sub> ) <sub>2</sub> soly	- log K <sub>d1</sub>	- log K <sub>d2</sub>	- log K. 80	
t/ºC	mol dm-3	mol dm-3				
35	0	0.003956			6.929	
	0.005169	0.004830	2.55			
ļ	0.009940	0.005438	2.49			
ļ	0.01491	0.006192	2.53	0.91		
[	0.02485	0.007354	2.54	0.89		
1	0.03727	0.008366	2.53	0.89		
}	0.04970	0.009714	2.55	0.92		
}		average	s: 2.54 ± 0.05	0.90 ± 0.02		
]						
40	0	0.004101			6.888	
{	0.004464	0.004956	2.64			
(	0.008928	0.005751	2.64			
	0.01488	0.006687	2.65	0.61		
}	0.02976	0.008691	2.69	0.62		
ļ	0.04464	0.010083	2.67	0.61		
1	0.08928	0.013531	2.67	0.60		
ĺ		average	es: 2.66 ± 0.03	$0.61 \pm 0.01$		
1		-				
45	0	0.005484			6.536	
]	0.005098	0.006750	2.74			
	0.01485	0.008796	2.74			
	0.02475	0.011002	2.81	0.30		
	0.02970	0.011620	2.79	0.34		
{	0.04455	0.014119	2.78	0.31		
{	0.04950	0.014828	2.77	0.30		
{		average	es: 2.77 ± 0.04	$0.31 \pm 0.03$		
K <sub>d1</sub> an	$d K_{d2}$ calculated from	eqs. [1] and [2] using usin	ig activity coeffi	cients calculated fro	om a modified Davies	
equation	on (2). The thermodyna	amic equilibrium constant	s are defined as	10110WS:		
1	7/		Cu(C.H.O.+\)-	*13		
	Kdi	$= [Cu^{2+}]y_2[C_3H_5O_3^{-}]y_1/[v_3]$		[1]		
1			-10-2/[Cu/C-11.4			
}	K <sub>d2</sub>	$= [Cu(C_3H_5O_3)^+][C_3H_5O_3]$	3-391-7[Cu(C3r15(	3)2] [2]		
Authors give $p_{K_B}$ for $HC_3H_5O_3$ as 3.83 at 25°C (volume unit basis). Authors state that plots of log K <sub>d</sub> vs						
1/(1/6	y are intear. From the	se pious, me tonowing tes	una were report	tou (presumation at 2	.J~C);	
reaction AG/keal mol-1 AH/keal mol-1 AS/cal K-1 mol-1						
1	fil 200	+ 0.06 - 8.90 + 0.24	4 -40 K +			
}	[1] 3.22	$1 \pm 0.05$ $-0.00 \pm 0.20$		03		
)	[2] 2.10	2.77 2.77	. <u></u> 1	v		
From	n lot of log K - ve 1/	T/K) using the data for 2	5, 30, 35, and 4	00C, the compilers	obtain (for 208 K) A	
H = 4	S keal mol-1 and AS -	-17 cal K-1 mol-1.	-,, -v, und 7	o o, mo computers	οσιατή (τοι 290 ic) Δ	
		- 4 / WILLE - 11101 -1				
l						
1						
COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Hydrogen chloride; HCl; [7647-01-0] (3) Glycylglycine; C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> ; [556-50-3] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Monk, C.B. Trans. Faraday Soc. <u>1951</u> , 47, 285-91.				
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VARIABLES: Concns of HCl and glycylglycine T/K = 298		PREPARED BY: H. Miyamoto and	PREPARED BY: H. Miyamoto and E.M. Woolley			
EXPERIMENTAL DATA:	The solubility of $Cu(IO_3)_2$	in aqueous HCl-glyc	ylglycine solu	tions at 25°C.		
HCl concn mol dm <sup>-3</sup>	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	107K <sub>d</sub> ª mol dm <sup>-3</sup>		
0.00033 0.00246 0.00020 0.00132	0.01006 0.01382 0.01356 0.02046	0.00366 0.00367 0.00383 0.00406	3.97 2.75 3.99 3.95	9.27 9.47 9.31 9.12		
<sup>a</sup> The dissociation constant for $CuC_4H_7N_2O_3^+$ calculated HIO <sub>3</sub> , CuCl <sup>+</sup> , CuIO <sub>3</sub> <sup>+</sup> , and for acid/base dissociation co well as for all AUXILIARY INFORMATION are given this author as well as in other compilations based on this		the d using literature values of $C_4H_8N_5$ n in the compilation this author's publication	lues for the di 203. Details o for the Cu(IO ions.	ssociation constants of n these calculations as 3)2-KCl-H2O system by		

<ol> <li>Copper iodate; (</li> <li>Sodium Hydroxi</li> <li>Glycylglycine; C</li> <li>Water; H<sub>2</sub>O; [77]</li> </ol>	Cu(IO <sub>8</sub> ) <sub>2</sub> ; [13454-89-2] ide; NaOH; [1310-73-2] C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> ; [556-50-3] 32-18-5]	Monk Trans	s, C.B.	DREMENTS: :. <u>1951,</u> 47, 285-	91.
VARIABLES: Concns of NaOH ar T/K = 298	1d glycylglycine	PREPA H. M	ARED BY: iyamoto and I	E.M. Woolley	
EXPERIMENTAL I	DATA: The solubility of	$Cu(IO_3)_2$ in aqueou	is NaOH-glyc	ylglycine solutio	ns at 25°C.
NaOH concn mol dm- <sup>3</sup>	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> concn mol dm <sup>-3</sup>	solubility mol dm <sup>-3</sup>	pH	107K <sub>d1</sub> ª mol dm <sup>-3</sup>	10 <sup>6</sup> K <sub>d2</sub> ª mol² dm <sup>-6</sup>
NaOH concn mol dm <sup>-3</sup> 0.00400	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> concn mol dm <sup>-3</sup> 0.01587	solubility mol dm- <sup>3</sup> 0.00483	рН 4.40	10 <sup>7</sup> K <sub>d1</sub> ª mol dm <sup>-3</sup> 9.06	10 <sup>6</sup> K <sub>d2</sub> ª mol <sup>2</sup> dm <sup>-6</sup> 2.34
NaOH concn mol dm- <sup>3</sup> 0.00400 0.00457	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> concn mol dm <sup>-3</sup> 0.01587 0.01580	solubility mol dm- <sup>3</sup> 0.00483 0.00507	pH 4.40 4.44	10 <sup>7</sup> K <sub>d1</sub> ª mol dm- <sup>3</sup> 9.06 7.7 <sup>b</sup>	10 <sup>6</sup> K <sub>d2<sup>a</sup></sub> mol <sup>2</sup> dm <sup>-6</sup> 2.34 2.60
NaOH concn mol dm <sup>-3</sup> 0.00400 0.00457 0.00601	C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> O <sub>3</sub> concn mol dm <sup>-3</sup> 0.01587 0.01580 0.01932	solubility mol dm- <sup>3</sup> 0.00483 0.00507 0.00557	рН 4.40 4.44 4.50	10 <sup>7</sup> K <sub>d1</sub> ª mol dm <sup>-3</sup> 9.06 7.7 <sup>5</sup> 8.8	10 <sup>6</sup> K <sub>d2<sup>a</sup></sub> mol <sup>2</sup> dm <sup>-6</sup> 2.34 2.60 2.31

 $Cu(C_4H_7N_2O_3)_2$  to  $Cu^{2+}$  and  $C_4H_7N_2O_3^{-}$ . All other equilibrium constants taken from the literature. For details on these calculations and for other AUXILIARY INFORMATION, see previous compilations of this author's publications.

<sup>b</sup>The author indicated that this value may be in error.

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Sodium glycollate (sodium hydroxyacetate); C <sub>2</sub> H <sub>3</sub> O <sub>3</sub> Na; [2836-32-0] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Evans, W.P.; Monk, C.B. J. Chem. Soc. <u>1951</u> , 550-7.
VARIABLES: Concentration of sodium glycollate T/K = 298	PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA: The solubility of $Cu(IO_3)_2$ in	aqueous sodium glycollate solutions at 25°C.
$C_2H_3O_3Na \text{ concn}$ $Cu(IO_3)_2 \text{ s}$ mol dm <sup>-3</sup> mol dm <sup>-1</sup>	
0.0         0.00326           0.01512         0.00645           0.02016         0.00736           0.03017         0.00899	0.0180 0.0169 0.0173
${}^{a}K_{d2}$ for $Cu(C_{2}H_{3}O_{3})_{2} = Cu^{2+} + 2C_{2}H_{3}O_{3}$ calculated for $K_{d1} = 0.00128$ mol dm <sup>-3</sup> . $K_{d1}$ is the equilibrium co $CuC_{2}H_{3}O_{3}$ . Activity coefficients estimated, and all AU previous works: e.g. see the compilations on the publica Soc. <u>1951</u> , 1786.	from material balance equations using an adjusted value nstant for the reaction $CuC_2H_3O_3^+ = Cu^{2+} +$ JXILIARY INFORMATION essentially identical to tion by Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem.

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Evans, W.P.; Monk, C.B.	
(2) Sodium <i>DL</i> -lactate (sodium 2-hydroxypropionate);		
$C_{3}H_{5}O_{3}Na;$ [72-17-3]	J. Chem. Soc. 1951, 550-7.	
(3) Water; H <sub>2</sub> O; [7732-18-5]		
VARIABLES:	PREPARED BY:	
Concentration of sodium DL-lactate		
T/K = 298	H. Miyamoto	
EXPERIMENTAL DATA: The solubility of $Cu(IO_3)_2$ in	n aqueous sodium DL-lactate solutions at 25°C.	
$C_3H_5O_3Na$ conch $Cu(1O_3)_2$	-8 $-12$ $12$ $2$	
mol dm-3 mol dm	-5 mol <sup>2</sup> dm <sup>-6</sup>	
0.00226		
0.0 0.00320		
0.01269 0.00634	0.0160	
0.01904 0.00770	0.0124	

 $K_{d2}$  for Cu(C<sub>3</sub>H<sub>5</sub>O<sub>3</sub>)<sub>2</sub> = Cu<sup>2+</sup> + 2C<sub>3</sub>H<sub>5</sub>O<sub>3</sub>- calculated from material balance equations using an adjusted value for K<sub>d1</sub> = 0.00095 mol dm<sup>-3</sup>. K<sub>d1</sub> is the equilibrium constant for the reaction CuC<sub>3</sub>H<sub>5</sub>O<sub>3</sub><sup>+</sup> = Cu<sup>2+</sup> + CuC<sub>3</sub>H<sub>5</sub>O<sub>3</sub><sup>-</sup>. Activity coefficients estimated, and all AUXILIARY INFORMATION essentially identical to previous works: e.g. see the compilations on the publication by Lloyd, M.; Wycherley, V.; Monk, C.B. J. Chem. Soc. <u>1951</u>, 1786.

0.0154

0.00883

0.02538

6		Copper	(II) lodate		
COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9] (3) Perchloric acid; HClO <sub>4</sub> [7601-90-3] (4) Deuterium oxide (water-d <sub>2</sub> ); D <sub>2</sub> O; [7789-20-0]		ORIGINAL Ramette, F J. Phys. C	MEASUREMENTS: R.W.; Broman, R.F. hem. <u>1963</u> , 67, 942-4	·	
VARIABL Concn of	ES: LiClO4 at [HClO4] =	0.0001 mol dm <sup>-3</sup>	PREPARED	) BY:	
T/K = 288, 298  and  308		G. Jancso,	H. Miyamoto and E.	M. Woolley	
EXPERIM	ENTAL DATA:	an anna			
Note that	for all solutions belo	w, the concentration of	HClO <sub>4</sub> is cons	tant at 0.0001 mol dn	1-3.
t∕⁰C	LiClO <sub>4</sub> concn mol dm <sup>-3</sup>	Cu(IO <sub>3</sub> ) <sub>2</sub> soly mol dm <sup>-3</sup>	t∕⁰C	LiClO <sub>4</sub> concn mol dm- <sup>3</sup>	Cu(IO <sub>3</sub> ) <sub>2</sub> soly mol dm <sup>-3</sup>
·			·		
14.7	0.000	0.00203	25.0	0.000	0.00235
	0.025	0.00236	*	0.025	0.00274
"	0.050	0.00255	*	0.050	0.00294
"	0.075	0.00271	"	0.075	0.00309
"	0.100	0.00279	"	0.100	0.00321
25.0	0.000	0.00272			
33.U "	0.000	0.00273			
	0.025	0.00309			
	0.030	0.00350			
	0.075	0.00352			
				continued	
		AUXILIARY	INFORMATI	ON	
METHOD	/APPARATUS/PRO	CEDURE:	SOURCE A	ND PURITY OF MA	TERIALS:
Method sa	me as in (1). Exces	s Cu(IO <sub>2</sub> ) <sub>22</sub> D <sub>2</sub> O added to	Cu(IO <sub>2</sub> )20D	•O prepared by addin	g 0.3 mol dm-8 KIO
LiClO4 so	lutions containing H	$ClO_4$ to supress hydroly	- and 0.15 m	ol dm- <sup>3</sup> CuSO₄ solutio	ons (both in $D_2O$ ) to
sis. Soluti	ions were rotated in	borosilicate glass bottles	60°C D2O	with constant stirring.	The solid was
for 2 d in	a thermostat at 3800	C, and then transferred	to digested at	this temperature for	one hour, collected o
a water ba	th thermostated at 3	5.0°C where they stood	a glass filte	er, and dried at 100°C	. Assay with EDTA
for 3 d w	ith occasional shakin	g. Saturated solutions	gave 99.9 %	6 purity. D <sub>2</sub> O (Gene	ral Dynamics Corp.)
were filte	red through fine por	ous glass by pressure,	was specifi	ed as 99.5 % pure.	
and 5 cm <sup>3</sup> aliquots were pipetted into titration flasks.					
Aliquots v	vere treated with 2 r	ni of 0.1 mol dm <sup>-3</sup> acet	$c   LiClO_4 and$	HClO <sub>4</sub> were reagent	grade.
acid + $0.1$	mol dm-3 sodium a	cetate buffer, and I dro	p		
UI SNAZOX	s indicator: the solut	ion was then titrated wi	<sup>In</sup>		
LUIA. I	ne EDIA solutions	were standardized with	ESTIMATE		
duplicate	titrations agreed to a	vithin 0.2 %	Solv room	D ERRUR: Incibility within 0.2 (	26
auphoate	anations agreed to v	· · · · · · · · · · · · · · · · · · ·	Temp: noth	ing specified	···
The bottle	s and remaining solu	tions were then equi-	iomp. noti	and speetied,	
librated in	a similar manner at	25.0°C, and finally at			······································
14.7ºC, an	d aliquots for analys	ses were taken at each	REFERENC	CES:	
temperature.			(1) Ramette	e, R.W.; Dratz, E.A.	J. Phys. Chem. 1963

(1) Ramette, R.W.; Dratz, E.A. J. Phys. Chem. 1963, **67,** 940.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	Ramette, R.W.; Broman, R.F.
(2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]	
(3) Perchloric acid; HClO <sub>4</sub> [7601-90-3]	J. Phys. Chem. <u>1963</u> , 67, 942-4.
(4) Deuterium oxide (water-d <sub>2</sub> ); D <sub>2</sub> O; [7789-20-0]	

EXPERIMENTAL DATA: (continued.....)

 $K_{s0}$  was calculated by the authors as  $K_{s0} = 4S^{3}Y$  where S is the experimental solubility and Y is the Debye-Huckel activity relation

 $log Y = -6AI^{1/2}/(1 + BI^{1/2})$  [1]

 $I = 3S + [LiClO_4] + [HClO_4]$  [2]

The calculations were carried out by plotting  $-log(4S^3)$  versus  $I^{1/2}$  while varying B so that the value of A was precisely the theoretical value at each temperature. The results are summarized below, and include the evaluation of the Gibbs free energy, enthalpy and entropy obtained in the usual way from a  $-log K_{s0}$  vs I/(T/K) plot. All are based on mol dm<sup>-3</sup> units, and the uncertainties expressed refer to the 90 % confidence intervals.

	Aa	В	
t∕⁰C	mol-1/2 dm <sup>3</sup> /2	mol-1/2 dm <sup>3/2</sup>	-log K <sub>s0</sub>
14.7	0.507	1.79	7.69 ± 0.02
25.0	0.515	1.85	7.51 ± 0.01
35.0	0.525	2.02	7.34 ± 0.03

Note: The authors point out that in carrying out the least squares treatment of the solubility data, the "best fit" does not correspond to the case where A is the theoretical value in eq. [1]. In fact, at 25°C in protium oxide (H<sub>2</sub>O), the sum of squares of deviations for the fit with A constrained to equal the theoretical values is 0.00059, whereas the "best fit" gives 0.00039 for the sum of the squares of deviations: in this case  $B = 3.2 \text{ mol}^{-1/2} \text{ dm}^{-3/2}$  and  $A = 0.752 \text{ mol}^{-1/2} \text{ dm}^{3/2}$  which gives  $-\log K_{s0} = -7.21$  rather than  $-\log K_{s0} = 7.13$  (see the compilation of the paper by these authors for the corresponding H<sub>2</sub>O system). Nothing analogous is mentioned about the treatment of D<sub>2</sub>O solubility data.

$\Delta G_{s0}$ kcal mol-1	ΔH <sub>s0</sub> kcal mol <sup>-1</sup>	ΔS <sub>s0</sub> cal K <sup>-1</sup> mol <sup>-1</sup>
10.25 ± 0.01	7.00 ± 0.30	$-10.9 \pm 0.9$

COMPONENTS:		ORIGINAL ME	ASUREMENTS:
1) Copper iodate; Cu	1(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]		
2) Lithium perchlora	ate; LiClO <sub>4</sub> ; [7791-03-9]	Gamjager, H.; (	Gerber, F.; Antonsen, O.
(3) Deuteroperchloric	acid; DClO <sub>4</sub> ;		
[19029-50-6]		Chimica <u>1973</u> , 2	27, 94-7
(4) Deuterium oxide;	D <sub>2</sub> O; [7789-20-0]		
VARIABLES:		PREPARED BY	/:
Concentration of LiC	$10_4$ and $DClO_4$ .		
$\Gamma/K = 274, 288, 298$	and 308.	H. Miyamoto a	and E.M. Woolley
EXPERIMENTAL DA	ATA:		
Using LiClO <sub>4</sub> and Dereported graphically. concentrations are be	ClO <sub>4</sub> to maintain a constant io The data were analyzed in te used on mol kg <sup>-1</sup> units (note th	nic strength of 1.0 mc erms of the following nat activity coefficient	ol kg <sup>-1</sup> , the soly of Cu( $IO_3$ ) <sub>2</sub> was eqns defining F as 2(soly) <sup>1.5</sup> where is are assumed to equal unity):
	$F = 2 \langle Cu^{2*} \rangle$	$\Big ^{1.5} = K_{s0}^{1/2} \left( 1 + \frac{\{D^*\}}{K_a} \right)$	$\frac{1}{2}$
where		<b>N</b>	<i>,</i>
	$K_{10} = (Cu^{2+})(10^{-})$	$^{2}$ and $K = (D)$	$(IO_3)$
		a (	' {DIO3}
From material balan	ce requirements and least squa	ares fitting, the follow	ing were reported:
t/ºC	-log K <sub>s0</sub>	-log Ka	Cu(IO <sub>3</sub> ) <sub>2</sub> soly/mol kg <sup>-1 a</sup>
1	6.821 ( $\sigma = 0.036$ )	$0.574 \ (\sigma = 0.020)$	0.00335
15	6.558 ( $\sigma = 0.019$ )	$0.602 \ (\sigma = 0.011)$	0.00402
25	6.411 ( $\sigma = 0.080$ )	$0.629 \ (\sigma = 0.023)$	0.0046 <sub>0</sub>
35	6.293 ( $\sigma = 0.021$ )	$0.731 \ (\sigma = 0.011)$	0.0050 <sub>3</sub>
■Solubilities calcd b	by compilers from $(K_{s0}/4)^{1/3}$ (	note ionic strength =	1.0 mol kg <sup>-1</sup> ).
	AUXILIA	RY INFORMATION	

Isothermal method. Excess cupric iodate deuterate was  $Cu_{s}(IO_{3})_{6.}2D_{2}O$  prepared as in (1). DClO<sub>4</sub> prepd by placed in glass ampoules and LiClO<sub>4</sub> and DClO<sub>4</sub> ion exchange of an NaClO<sub>4</sub> solution. DClO<sub>4</sub> contained < 0.01 % Na and < 0.2 % H. LiClO<sub>4</sub> prepd from solutions added to maintain the ionic strength at 1.0 mol kg-1. The ampoules were sealed and shaken in a Li<sub>2</sub>CO<sub>3</sub> and HClO<sub>4</sub> followed by several recrystallizawater thermostat with a precision in temperature of  $\pm$ tions.  $D_2O$  was > 99.8 % D as obtained from 0.1ºC. After equilibrium was reached, samples of Wurlington E.I.R. saturated solution were removed by millipore filtration and analyzed for cupric iodate by iodometric titration. X-ray powder diffraction patterns of the solid phase before and after equilibration indicated the solid phase to be  $Cu_3(IO_3)_6.2D_2O$ .

**ESTIMATED ERROR:** Standard deviations for K<sub>s0</sub> given above. Temp: precision  $\pm 0.1$  K.

#### **REFERENCES:** (1) Ramette, R.W.; Broman, R.F. J. Phys. Chem., <u>1963, 67, 942.</u>

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2]	ORIGINAL MEASUREMENTS: Miyamoto, H.
(2) Tetrahydrofuran; C <sub>4</sub> H <sub>8</sub> O; [109-99-9]	Nippon Kagaku Kaishi <u>1972,</u> 659-61.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Solvent composition. T/K = 298.	H. Miyamoto

The solubility of  $Cu(IO_3)_2$  in water-tetrahydrofuran mixtures at 25°C is given below.

C <sub>4</sub> H <sub>8</sub> O composition		solubility
mass %	mol %	mole dm-3
0	0.0	0.00347
5	1.3	0.00235
10	2.7	0.00172
15	4.2	0.00125
20	5.9	0.00092
25	7.7	0.00064
30	9.7	0.00050
40	14.3	0.00026

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Excess copper iodate and solvent were placed in glass stoppered bottles, and the bottles were placed in a thermostat at 25°C and rotated for 48 hours. The solutions were allowed to settle, and aliquots withdrawn through a siphon tube equipped with a sintered glass filter. The iodate content in the saturated solutions was determined by iodometric titration.	Cu(IO <sub>3</sub> ) <sub>2</sub> •H <sub>2</sub> O was prepared by dropwise addition of equivalent solutions of Cu(NO <sub>3</sub> ) <sub>2</sub> (Wako Co., reagent grade) and KIO <sub>3</sub> (Wako, reagent grade) into a large volume of KNO <sub>3</sub> solution. The ppt was washed and dried under reduced pressure. Tetrahydrofuran was distilled from NaOH and then redistilled from metallic sodium.	
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K.	
	REFERENCES:	

COMPONENTS: (1) Copper iodate; Cu(IO <sub>3</sub> ) <sub>2</sub> ; [13454-89-2] (2) N,N-Dimethylformamide; C <sub>3</sub> H <sub>7</sub> NO; [68-12-2] (3) Water; H <sub>2</sub> O; [7732-18-5]				ORIGINA	ORIGINAL MEASUREMENTS:			
				Miyamot	Miyamoto, H.; Yamamoto, M.; Maruyama, Y.			
				Nippon H	Nippon Kagaku Kaishi <u>1979,</u> 546-8.			
VARIABLES: Solvent composition. T/K = 293, 298 and 303.			PREPAR H. Miyar	PREPARED BY: H. Miyamoto				
EXPERI	IMENTAL DA	ATA:	<u></u>					
	C <sub>3</sub> H <sub>7</sub> NO com	position	solubility		C <sub>3</sub> H <sub>7</sub> NO com	position	solubility	
t/ºC	mass %	mol %	mol dm-3	t∕⁰C	mass %	mol %	mol dm-3	
20.0	0.0 5.04	0.0 1.29	0.00321 0.00255	30.0	0.0 5.31	0.0 1.36	0.00365 0.00290	

9.76

15.44

19.84

24.85

30.14

40.58

2.60

4.31

5.75

7.54

9.61

14.41

0.00236 0.00179

0.00145

0.00113

0.00083

0.00046

# AUXILIARY INFORMATION

AUXIMANT INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Excess copper iodate and solvent were placed in glass stoppered bottles, and the bottles were placed in a thermostat at a specified temperature and rotated for 72 hours. Samples of saturated solution were filtered through glass filters, and aliquots were diluted with water. The iodate concentration was then determined iodometrically.	$Cu(IO_3)_2.H_2O$ was prepared by addition of dilute solutions of $Cu(NO_3)_2$ and $KIO_3$ to boiling water. The ppt was washed and dried at room temp. The monohydrate was obtained. $C_3H_7NO$ (Mitsubishi Gas Chem. Co.) was distilled under reduced pressure, dried with $Na_2CO_3$ and redistilled three more times.			
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K.			
	REFERENCES:			

9.99

14.59

20.35

24.89 30.53

40.49

0.0

4.93

9.89

14.99

20.11

24.76

29.73

40.44

25.0

2.66

4.04

5.92

7.55

9.77

14.36

0.0

1.26

2.63

4.16

5.84

7.50

9.44

14.34

0.00200

0.00157

0.00118

0.00093

0.00070

0.00038

0.00344

0.00277

0.00218

0.00171 0.00131

0.00104

0.00078

0.00041

### COMPONENTS:

(1) Silver chlorate; AgClO<sub>3</sub>; [7783-92-8]

(2) Water; H<sub>2</sub>O; [7732-18-5]

## EVALUATORS:

H. Miyamoto Niigata University Niigata, Japan July, 1987

#### **CRITICAL EVALUATION:**

#### THE BINARY SYSTEM

Data for the solubility of  $AgClO_3$  in water have been reported in three publications (1-3). Noonan (1) and Ricci and Offenbach (2) reported solubilities in mass units (converted to molalities by the compilers), and Mel'nichenko and Gyunner (3) reported the solubility of  $AgClO_3$  at 293.2 K in mol dm<sup>-3</sup> units. In the absence of density data, direct comparisons of the results of (3) to those in (1, 2) cannot be made. However, the singular value for the solubility of  $AgClO_3$  in pure water at 293.2 K reported in (3) appears to be low. No hydrates of  $AgClO_3$  have been reported, and Ricci and Offenbach (2) have confirmed that the solid phase at 298.2 K is the anhydrous salt.

The experimental solubilities reported in (1) for 278.2 K to 308.2 K and the singular value from (2) for 298.2 K were fitted to the following smoothing equation:

$$Y_{x} = \frac{-220207.71}{T/K} - 1480.209 \ln(T/K) + 8404.654 - 2.55109(T/K)$$
[1]

where  $\sigma_{\rm Y} = 0.009$  and  $\sigma_{\rm x} = 7.4 \times 10^{-5}$  ( $Y_{\rm x}$  and the standard errors,  $\sigma$  are defined in the PREFACE). Based on this smoothing equation, the evaluator calculated tentative solubilities at selected temperatures which are given in Table 1 below.

Table 1. Tentative solubilities of AgClO<sub>3</sub> in water calculated from eq. [1]

	AgClO <sub>3</sub>	AgClO <sub>3</sub>
T/K	mol kg <sup>-1</sup>	mol %
278.2	0.445	0.795
283.2	0.535	0.955
288.2	0.637	1.035
293.2	0.753	1.338
298.2	0.887	1.573
303.2	1.047	1.851
308.2	1,241	2.187

#### REFERENCES

- 1. Noonan, E. C. J. Am. Chem. Soc. 1948, 70, 2915.
- 2. Ricci, J. E.; Offenbach, J. A. J. Am. Chem. Soc. 1951, 73, 1597.
- Mel'nichenko, L. M.; Gyunner, E. A. Zh. Neorg. Khim. <u>1967</u>, 12, 1524; Russ. J. Inorganic Chem. (Engl. Transl.) <u>1967</u>, 12, 801.

F				
COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver chlorate; AgClO <sub>3</sub> ; [7783-92	-8]	Noonan, E.C.		
	-			
(2) Water: HaO: 17732-18-51		J. Am. Chem. Soc. 1948, 70, 2915-8		
(2) (aloi, 1120, [1102-10-0]		bi /im. Chemi Soci 12:10, 70, 2715 0.		
VARIABLES:		PREPARED BY:		
1				
T/K = 278.15, 288.15, 298.15 and	308.15	H. Miyamoto and E.M. Woolley		
EXPERIMENTAL DATA:				
	AnClOs solubility	$\Delta \sigma C   \Omega_{r}$ solubilitys		
	Agelog solubility			
t/°C	mol/100 mol wate	r moi kg-1		
5.0	0.8017	0.445 <sub>0</sub>		
15.0	1.1481	0.637 <sub>3</sub>		
25.0	1.604 <sub>0</sub>	0.8904		
35.0	2.2353	1.2408		
Molalities calculated by the compile				
whole the complete by the complete				
	ATTYLLADY IN	FORMATION		
METHOD/APPARATUS/PROCEDU	RE:	SOURCE AND PURITY OF MATERIALS:		
Freess AgCIOs was placed into 6-8 r	al Pyrey cansules	$AaClO_{2}$ was prepared from NaClO <sub>2</sub> and AgNO <sub>2</sub> and		
Excess Ageres was placed into 0-8 i	and Toulibut	Agenes was prepared from Racios and Agrees, and		
water was added, and the ampoules s	ealed. Equilibri-	the product then recrystallized two to rive times.		
um was approached from the high te	mperature side	Water was probably distilled from alkaline perman-		
only. Samples were rotated 12 to 48	hours in a water	ganate solution, and the electrolytic conductivity was		
bath controlled to $\pm$ 0.05 K or better.	They were then	checked.		
allowed to settle for one hour, and 2-	-5 cm <sup>3</sup> aliquots			
were withdrawn through glass wool	The samples were			
transforred to 20 cm <sup>8</sup> Dt grusshing w	into sumples were			
transferred to 50 cm <sup>o</sup> Ft cruciples, w	eigned to 1 mg			
and carefully evaporated and dried to	constant mass (to			
0.05 mg) in an oven or desiccator. B	uoyancy correc-			
tions were applied. All determination	ns were performed			
in duplicate and repeated if discrepan	icies were greater			
than 0.5 %				
		ESTIMATED ERROR:		
		Solv: precision at least $\pm 0.5$ %		
		Soly: precision at least ± 0.5 %.		
		Soly: precision at least $\pm$ 0.5 %. Temp: precision $\pm$ 0.05 K or better.		
		Soly: precision at least $\pm$ 0.5 %. Temp: precision $\pm$ 0.05 K or better.		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better.		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better. REFERENCES:		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better. REFERENCES:		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better. REFERENCES:		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better. REFERENCES:		
		Soly: precision at least ± 0.5 %. Temp: precision ± 0.05 K or better. REFERENCES:		

I

COMPONENTS: (1) Silver chlorate; AgClO <sub>3</sub> ; [7783-92-8]	ORIGINAL MEASUREMENTS: Ricci, J.E.; Offenbach, J.A.
(2) Sodium chlorate; NaClO <sub>3</sub> ; [7775-09-9] (3) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1951</u> , 73, 1597-9.
VARIABLES: Composition T/K = 298	PREPARED BY: H. Miyamoto

In the ternary AgClO3-NaClO3-H2O system, 'type five' Roozeboom solid solutions were reported.

NaClO3 mass %	NaClO₃ mol %ª	AgClO <sub>3</sub> mass %	AgClO₃ mol %ª	nature of the solid phase <sup>b</sup>
0	0	14.46	1.567	AgClO <sub>3</sub>
8.11	1.630	10.02	1.121	SSI
17.49	3.762	7.48	0.895	SSI
27.53	6.463	5.56	0.726	SSI
34.39	8.610	4.23	0.589	SSI
41.78	11.276	2.85	0.428	SSI
46.57	13.275	2.14	0.339	SSI + SSII
46.54	13.263	2.15	0.341	SSI + SSII
46.55	13.268	2.15	0.341	SSI + SSII
47.52	13.628	1.66	0.265	SSII
49.23	14.220	0.56	0.090	SSII
50.04	14.495	0	0	NaClO <sub>3</sub>

<sup>a</sup>Mass % solubilities calculated by the compiler. In pure water, the compiler calculates a solubility of  $0.755_8$  mol kg<sup>-1</sup> for AgClO<sub>3</sub> at 25<sup>o</sup>C.

<sup>b</sup>The limiting compositions of solid solutions I and II were estimated as ~ 37 mass % NaClO<sub>3</sub> in solid solution SSI, and ~ 26 mass % AgClO<sub>3</sub> in solid solution SSII. The composition of the isothermally invariant liquid with these two limiting solid solutions is 2.15 mass % AgClO<sub>3</sub> and 46.55 mass % NaClO<sub>3</sub>.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Isothermal method. Ternary mixtures of known com- position were allowed to equilibrate at $25^{\circ}$ C for two weeks with stirring. The equilibrium compositions were unchanged after an additional 1-3 weeks of stirring. Aliquots of saturated solution were filtered and analyzed for silver and for total solids. Silver was analyzed by titration with standard KSCN solution, and total solids determined by evaporation to dryness at 110-125°C. NaClO <sub>3</sub> was determined by difference.	AgClO <sub>3</sub> was prepared from 'c.p. grade' AgNO <sub>3</sub> and NaClO <sub>3</sub> . The product was recrystallized three times and analyzed gravimetrically as AgCl after reduction with NaNO <sub>3</sub> in the presence of NaCl. Purity was reported as 99.72 %.			
	ESTIMATED ERROR: Soly: precision ~ ± 0.03 mass % (compiler). Temp: precision probably better than ± 0.1 K (compiler).			
i	REFERENCES:			

COMPONENTS: (1) Silver chlorate; AgClO <sub>3</sub> ; [7783-92-8] (2) 1,3,5,7-Tetraazatricylo[3.3.1.1 <sup>3,7</sup> ]-decane (hexa-	ORIGINAL MEASUREMENTS: Mel'nichenko, L.M.; Gyunner, E.A.			
methylenetetramine); $C_6H_{12}N_4$ ; [100-97-0]	Zh. Neorg. Khim. <u>1967</u> , 12, 1524-8: Russ. J. Inorg.			
(3) Water; H <sub>2</sub> O; [7732-18-5]	Chem. (Engl. Transl.) <u>1967</u> , 12, 801-4.			
VARIABLES:	PREPARED BY:			
$\frac{\text{Composition}}{\text{T/K} = 293.2}$	H. Miyamoto and E.M. Woolley			
EXPERIMENTAL DATA:				
The solid phase was probably not simply $AgClO_3$ , but was instead either (A) hexamethylenetetramine disilver(I) dichlorate, $[Ag_2C_6H_{12}N_4](ClO_3)_2$ , or (B) hexamethylenetetramine silver(I) chlorate, $[AgC_6H_{12}N_4]ClO_3$ .				

mol ratio of $C_6H_{12}N_4^{a}$	solubility mol dm- <sup>3</sup>	[C <sub>6</sub> H <sub>12</sub> N <sub>4</sub> ] <sub>tot</sub> b mol dm <sup>-3</sup>	probable solid phase
0	0.285	0	А
0.10	0.187	0.029	Α
0.20	0.102	0.057	Α
0.30	0.048	0.086	A and B
0.333	0.028	0.095	В
0.40	0.022	0.114	В
0.45	0.018	0.128	В
0.50	0.010	0.143	в
0.55	0.010	0.157	В
0.60	0.011	0.171	В
0.70	0.012	0.200	В
0.80	0.013	0.228	В
0.90	0.014	0.257	В
0.95	0.014	0.271	В
1.00	0	0.285	none

\*Defined as initial  $[C_6H_{12}N_4]/(initial [C_6H_{12}N_4] + initial [AgClO_3])$ . \*Calculated by the compilers.

continued.....

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Aqueous solutions of $AgClO_3$ and $C_6H_{12}N_4$ (each 0.285 mol dm <sup>-3</sup> ) were mixed to give 20 cm <sup>3</sup> total volume. The mixtures were stirred vigorously for 24 hours at 20°C. White crystalline precipitates formed in mixtures containing less than 19 moles of the amine for each mole of AgClO <sub>3</sub> . The total silver in the liquid phase was determined gravimetrically by precipitation as the chloride after decomposing the hexamethylenetetramine with nitric acid. Solid [AgC <sub>6</sub> H <sub>12</sub> N <sub>4</sub> ]ClO <sub>3</sub> was equilibrated for 48 hours while shaking.	"Analytical reagent" grade silver chlorate and hexa- methylenetetramine, and twice distilled water were used. $[AgC_6H_{12}N_4]ClO_8$ was prepared from equimolar solutions of the chlorate and the amine. After 24 hours, the product was filtered and dried at room temperature, and then at 108°C to constant mass. Analysis showed the hydrate to be stable at room temperature, and the anhydrous form at 108°C.			
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.1 K.			
	REFERENCES:			

COMPONENTS.	<u></u>	ODICINAL MEASUDEMENTS.			
(1) Silver chlorate: AsCIO.: 17783-	92-81	ORIGINAL MEASUREMENIS: Mel'nichenko, I.M.; Gyunner, F.A.			
(2) 1.3.5.7-Tetraazatricylo[3.3.1.18,	71-decane (hexa-	Mer menenko, E.M., Oyunner, E.A.			
methylenetetramine): CeH12N4:	[100-97-0]	Zh. Neorg. Khim. 1967, 12, 1524-8: Russ. J. Inorg.			
(3) Water; H <sub>2</sub> O; [7732-18-5]	[	Chem. (Engl. Transl.) <u>1967</u> , 12, 801-4.			
COMMENTS AND/OR ADDITION	NAL DATA: (cor	itinued)			
The author also measured the refra compounds $[Ag_2C_6H_{12}N_4](ClO_3)_2$ a prepared and confirmed from solu dried and equilibrated with several results of these experiments are given	active indices of the s nd $[AgC_6H_{12}N_4]ClO_3$ tions containing equal l aqueous $C_6H_{12}N_4$ so ven in the table below	solutions. The formation of two sparingly soluble was postulated. A compound $[AgC_6H_{12}N_4]ClO_3 H_2O$ was l moles of AgClO <sub>3</sub> and C <sub>6</sub> H <sub>12</sub> N <sub>4</sub> . This compound was lutions which were then analyzed for silver, and the v.			
initial concn of	equilibrium conc	on of			
CeH12N4	C <sub>6</sub> H <sub>12</sub> N <sub>4</sub>	solubility			
mol dm-3	mol dm-3	mol dm-3			
•	•	0.01020			
0	0	0.01032			
0.1485	0.1440	0.01224			
0.2890	0.2782	0.01781			
0.3574	0.4623	0.01975			
0.5700	0.5435	0.02118			
0.6827	0.6497	0.02400			
(AgC <sub>6</sub> H <sub>12</sub> )	N₄)ClO3(s) = AgC6H12	N4+ + ClO3-			
log K,0 =	[AgC <sub>6</sub> H <sub>12</sub> N <sub>4</sub> +][ClO <sub>3</sub> -]	= $1.065 \times 10^{-4} \mod^2 dm^{-6}$			
(AgC <sub>6</sub> H <sub>12</sub> N	$(AgC_{6}H_{12}N_{4})ClO_{3}(s) + C_{6}H_{12}N_{4} = Ag(C_{6}H_{12}N_{4})_{2}^{+} + ClO_{3}^{-}$				
log K <sub>*1</sub> =	$\log K_{s1} = [Ag(C_6H_{12}N_4)_2^+][ClO_3^-]/[C_6H_{12}N_4] = 2.25 \times 10^{-4} \text{ mol dm}^{-3}$				
(AgC <sub>6</sub> H <sub>12</sub> N	$(AgC_{6}H_{12}N_{4})ClO_{3}(s) + 2C_{6}H_{12}N_{4} = Ag(C_{6}H_{12}N_{4})_{3} + ClO_{3}$				
log K <sub>s2</sub> =	[Ag(C <sub>6</sub> H <sub>12</sub> N <sub>4</sub> ) <sub>3</sub> +][ClO <sub>5</sub>	$\frac{1}{C_6H_{12}N_4} = 7.90 \times 10^{-4}$			

COMPONENTS:			ORIGINAL MEASUREMENTS:	
[1] Silver chlorate; AgClO <sub>3</sub> ; $[7783-92-8]$			Noonan, E.C.	
(2) Water; H <sub>2</sub> O; [7732-18-5]			J. Am. Chem. Soc. <u>1948</u> , 70, 2915-8.	
(3) Deuterium	oxide (water-d <sub>2</sub> ); D <sub>2</sub> O	; [7789-20-0]		
VARIABLES:			PREPARED BY:	
T/K = 278.15,	288.15, 298.15 and	308.15	W.A. Van Hook and E.M. Woolley	
EXPERIMENT	AL DATA:			
	D <sub>2</sub> O content	AgClO <sub>3</sub> solubil	ity AgClO <sub>3</sub> solubility <sup>a</sup>	
t/ºC	mol %	mol/100 mol w	ater mol kg-1	
5.0	98.3 <sub>8</sub>	0.6532	0.3267	
15.0	98.3 <sub>8</sub>	0.9567	0.4785	
25.0	98.38	1.3578	0.6791	
35.0	98.1 <sub>8</sub>	1.9076	0.9542	
	••••			
The authors commol % $D_2O$ . T	mputed the expected s he results of these cal	olubility in pure (1 culations are given	00 %) $D_2O$ assuming a linear change in solubility with below.	
		AgClO <sub>2</sub> solubil	ity AgClO <sub>2</sub> solubility <sup>a</sup>	
	t∕₀C	mol/100 mol I	$p_2O$ mol kg <sup>-1</sup>	
	5.0	0.650.	0 325.	
	15.0	0.0508	0.476	
	15.0	0.3355	0.475	
	25.0	0.13337	0.0759	
	35.0	0.19015	0.9494	
■Molalities calc	ulated by the compile	rs.		
		AUXILIARY IN	IFORMATION	
METHOD/APP	ARATUS/PROCEDU	RE:	SOURCE AND PURITY OF MATERIALS:	
Excess AgClO <sub>3</sub> was placed into 6-8 ml Pyrex capsules, water was added, and the ampoules sealed. Equilibri- um was approached from the high temperature side only. Samples were rotated 12 to 48 hours in a water bath controlled to $\pm$ 0.05 K or better. They were then allowed to settle for one hour, and 2-5 cm <sup>3</sup> aliquots were withdrawn through glass wool. The samples were transferred to 30 cm <sup>3</sup> Pt crucibles, weighed to 1 mg and carefully evaporated and dried to constant mass (to 0.05 mg) in an oven or desiccator. Buoyancy correc- tions were applied. All determinations were performed in duplicate and repeated if discrepancies were greater than 0.5 %.			AgClO <sub>3</sub> was prepared from NaClO <sub>3</sub> and AgNO <sub>3</sub> , and the product then recrystallized two to five times. $D_2O$ was distilled consecutively from alkaline permanganate solution and then from K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> or CrO <sub>3</sub> solution, and the electrolytic conductivity of the final product was 2 x 10 <sup>-6</sup> S cm <sup>-1</sup> or less. The D <sub>2</sub> O content was computed from the measured density at 25°C relative to 1.10763 g cm <sup>-3</sup> for pure D <sub>2</sub> O.	
			Soly: precision at least ± 0.5 %.	
			Temp: precision ± 0.05 K or better.	
			REFERENCES:	

<b></b>			
COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver chlorate; AgClO <sub>3</sub> ; [7783-92-8]		Mel'nichenko, L.M.; Gyunner, E.A.	
(2) 1,3,5,7-Tetraazatricylo[3.3.	1.13.7]-decane (hexa-		
methylenetetramine); $C_6H_{12}N_4$ ; [100-97-0]		Zh. Neorg. Khim. <u>1967</u> , 12, 1524-8: Russ. J. Inorg.	
(3) Methanol; CH <sub>4</sub> O; [67-56-1	]	Chem. (Engl. Transl.) <u>1967</u> , 12, 801-4.	
VARIABLES:		PREPARED BY:	
Composition			
T/K = 293.2		H. Miyamoto and E.M. Woolley	
EXPERIMENTAL DATA:		1,	
The solid phase was probably	not simply AgClO <sub>3</sub> , but v	vas instead either (A) hexamethylenetetramine disilver(I)	
dichlorate, [Ag <sub>2</sub> C <sub>6</sub> H <sub>12</sub> N <sub>4</sub> ](ClO <sub>3</sub>	3)2, or (B) hexamethylene	tetramine silver(I) chlorate, $[AgC_6H_{12}N_4]ClO_3$ .	
C-H-NA	colubility -	archable	
mat %	soluting p	id phase	
mor %	mor um-s so	iu phase	
	0.0184 no	na	
10	0.0104 10	$\mathbf{a} \in \mathbf{C} \cdot \mathbf{H} = \mathbf{N} \cdot \mathbf{V} \in [\mathbf{O} \cdot \mathbf{V}]$	
10	0.0101 (A	82C6112144)(CIO3)2	
20	0.0003	1	
30	0.0023		
33	0 (A	$g_{2} C_{6} G_{12} N_{4} (C   C_{3})_{2} + (A g C_{6} G_{12} N_{4}) C   C_{3}$	
55 10 100	0 (A	BC6H12N4/CIO3	
	AUXILIARY I	NFORMATION	
METHOD/APPARATUS/PRO	CEDURE:	SOURCE AND PURITY OF MATERIALS:	
Methanolic solutions of AgClC	$D_3$ and $C_6H_{12}N_4$ (each	"Analytical reagent" grade silver chlorate and hexa-	
0.0184 mol dm <sup>-3</sup> ) were mixed	to give 20 cm <sup>3</sup> total	methylenetetramine were used. Methanol was distilled	
volume. The mixtures were s	tirred vigorously for 24	twice.	
hours at 20°C. White crystalli	ne precipitates formed in		
all mixtures. The total silver	in the liquid phase was		
determined gravimetrically by	precipitation as the		
chloride after decomposing the	e hexamethylenetetramine		
with nitric acid.			
		ECTIMATED EDDOD	
		ESTIMATED ERROR:	
		Soly: nothing specified.	
		remp: precision ± 0.1 K.	
		REFERENCES:	
•		1	

COMPONENTS:	EVALUATORS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	H. Miyamoto Niigata University	M. Salomon U.S. Army, ET & DL	
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata, Japan July, 1987	Ft. Monmouth, NJ, USA	
CRITICAL EVALUATION.			

## THE BINARY SYSTEM

Data for the solubility of AgBrO<sub>3</sub> in water have been reported in 36 publications (1-36). Eight publications reported the solubilities in mass units (6, 7, 10, 11, 13, 33-35), and the remaining 28 publications (1-5, 8, 9, 12, 14-32, 36) reported solubilities in mol dm-3 units. Table 1 summarizes the experimental solubilities based on mass units, and Table 2 summarizes the solubilities based on mol dm<sup>-3</sup> units. The solid phase down to at least 278 K is the anhydrous AgBrO<sub>3</sub> (11).

Table 1. Summary of experimental solubilities based on mass units.

mmol kg <sup>-1</sup>	$10^4\chi$	ref
3.84	0.692	11
8.062	1.463	7
8.19	1.475	13
8.27	1.490	10
8.31	1.497	6
8.67	1.562	11
9.63	1.735	6
9.8	1.765	33
10.2	1.837	34
10.2	1.837	35
11.41	2.055	6
13.40	2.413	6
15.74	2.835	6
18.3	3.296	6
18.36	3.307	11
21.08	3.796	6
24.18	4.354	6
27.48	4.948	6
31.17	5.612	6
35.29	6.354	6
39.70	7.147	6
44.75ª	8.055	6
56.20ª	10.11	6
	mmol kg <sup>-1</sup> 3.84 8.062 8.19 8.27 8.31 8.67 9.63 9.8 10.2 10.2 11.41 13.40 15.74 18.3 18.36 21.08 24.18 27.48 31.17 35.29 39.70 44.75 <sup>a</sup> 56.20 <sup>a</sup>	mmol kg <sup>-1</sup> $10^4\chi$ 3.840.6928.0621.4638.191.4758.271.4908.311.4978.671.5629.631.7359.81.76510.21.83710.21.83711.412.05513.402.41315.742.83518.33.29618.363.30721.083.79624.184.35427.484.94831.175.61235.296.35439.707.14744.75*8.05556.20*10.11

\*Rejected values

The experimental mole fraction (x) solubilities in Table 1 were fitted to the following smoothing equation

$$Y_{x} = \frac{-25941.73}{T/K} - 117.4041 \ln(T/K) + 688.443 + 0.171916(T/K)$$
[1]

where

$$Y_{x} = ln\left(\frac{\chi^{\nu}(1-\chi)^{r}(\nu+r)^{\nu+r}}{r'(1+\chi)^{\nu+r}}\right)$$
[2]

All terms in eq. [2] are defined in the PREFACE. The standard error in the function  $Y_x$  of eq. [2] is  $\sigma_y =$ 0.038, and for the mole fraction solubilities,  $\sigma_x = 3.3 \times 10^{-6}$ ; two data points were rejected on the basis that

COMPONENTS:	EVAL	EVALUATORS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Н. М	iyamoto	M. Salomon
	Niiga	ta University	US Army, ET & DL
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niiga July,	ta, Japan 1987	Ft. Monmouth, NJ, US
CRITICAL EVALUATION:			
Table 2. Summar	y of experimental solub	ilities based on mo	ol dm <sup>-s</sup> units.
T/K	mmol dm <sup>-3</sup>	references	
288.2	6.07	26, 27	
293.1	6.31ª	3	•
293.2	7.28ª	16, 18-23, 25-	29
297.7	8.10	2	
298.2	7.10ª	I	
	8.03	30	
"	8.09	14	
n	8.11	15	
•	8.12	8	
*	8.131	9	
•	8.25	17, 24	
	8.26	12	
*	8.2668	5	
*	8.59ª	16, 18-23, 25-	29, 31, 32
300.2	7.25ª	4	
303.2	10.02ª	16, 18-23, 25-	29
308.2	11.62*	31, 32	

\*Rejected values

 $(\chi_{obsd} - \chi_{calcd}) > 2\sigma_x$ . Thus the smoothing equation [1] is based on the remaining 21 data points. Solubilities calculated from eq. [1] are designated as recommended, and values at selected temperatures are given in Table 4.

For the solubilities reported in mol dm<sup>-3</sup> units, and using the criteria that  $c_{obsd} - c_{calcd} \le 2\sigma$ , 10 data points were fitted by a relative least squares method to the following empirical smoothing equation:

 $\ln(c_1/\text{mol dm}^{-3}) = -250101.7 + 340886.6/(T/100\text{K}) + 231859\ln(T/100\text{K}) - 39418.4(T/100\text{K})$ 

[3]

where  $\sigma_c = 7 \times 10^{-5}$ . Solubilities calculated from eq. [3] are designated as tentative, and are also included in Table 4. It should be noted that using the recommended solubility of 0.00831 mol kg<sup>-1</sup> at 298.2 K and Owen's density of 0.9987 g cc<sup>-1</sup> (8) yields a solubility of 0.00828 mol dm<sup>-3</sup> which differs from the tentative value in Table 4. For this reason, the mol dm<sup>-3</sup> solubilities calculated from eq. [3] are designated tentative.

The thermodynamic solubility product has been reported in 9 publications (12, 14, 17, 24, 30, 36, 39-41). All but one are based on mol dm<sup>-3</sup> units, the exception being (36) where  $K_{s0}^{0}$  is based on mol kg<sup>-1</sup> units. A summary of the results and methods used to compute the solubility products is given in Table 3. It appears that some authors reported the same value for the solubility product in several publications as indicated in Table 3, and in fitting these data to the empirical smoothing equation below, these data points were treated as singular determinations. Only one data point was rejected from (40, 41) since it is obviously too low. The studies in (40, 41) do not report solubility data, but report solubility products based on e.m.f. measurements in pure water and in aqueous mixtures with 1,4-dioxane, glycerol or urea: these papers have been rejected and therefore not compiled. The remaining 6 data points based on mol dm<sup>-3</sup> units were fitted to the following smoothing equation:

$$\ln\left(\frac{K_{00}^{2}}{m0^{2} dm^{-6}}\right) = 37.0874 - 97.4716(T/100K) - 13.0224\ln(T/100K)$$
[4]

COMPONENTS:	EVALUATORS:	
<ul> <li>(1) Silver bromate; AgBrO<sub>3</sub>; [7783-89-3]</li> <li>(2) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	H. Miyamoto Niigata University Niigata, Japan July, 1987	M. Salomon US Army, ET & DL Ft. Monmouth, NJ, USA

From eq. [4], the standard error in  $K_{s0}^0$ ,  $\sigma_K$ , = 9.0 x 10<sup>-7</sup>. The thermodynamic solubility products calculated from eq. [4] are designated as recommended, and values at selected temperatures are given in Table 4.

Table 3. Summary of thermodynamic solubility products in water based on mol dm<sup>-3</sup> units

T/K	10 <sup>5</sup> K <sub>s0</sub> 0	method <sup>b</sup>	reference
287.9	2.648	А	39
298.2	2.40ª	D	40, 41
n	5.291	В	14
*	5.358	В	30
	5.433	Α	39
	5.5	С	12, 17, 24
308.2	10.14	Α	39

<sup>a</sup>Rejected value (papers not compiled).

<sup>b</sup>Methods A-C all based on calculations of  $K_{s0}^0 = [AgBrO_3]^2 y_{\pm}^2$ .

A: from solubility measurements in LiClO<sub>4</sub> + HClO<sub>4</sub>,  $y_{\pm}$  calculated from the Debye-Hückel equation  $\ln y_{\pm} = -A I^{1/2}/(1 + B I^{1/2})$ .

B: from solubility measurements in the presence of added electrolytes,  $y_{\pm}$  calculated from the Davies equation. C: from solubility measurements in the presence of added electrolytes,  $y_{\pm}$  calculated as in A above.

D: solubility product calculated from standard e.m.f. values.

# Table 4. Recommended solubilities based on mass units calculated from eq. [1] (columns 2-3)Tentative mol dm-3 solubilities calculated from eq. [3] (column 4)Recommended solubility products calculated from eq. [4] (column 5)

T/K	$10^4\chi$	mmol kg <sup>-1</sup>	mmol dm <sup>-3</sup>	$10^5 K_{s0}^{0}$
278.2	0.693	3.85		
283.2	0.852	4.73		
288.2	1.038	5.76	6.06	2.71
293.2	1.252	6.95	6.37	3.85
298.2	1.497	8.31	8.16	5.39
303.2	1.777	9.86		7.44
308.2	2.093	11.62		10.14
313.2	2.449	13.58		
318.2	2.847	15.81		
323.2	3.292	18.28		
328.2	3.787	21.03		
333.2	4.336	24.08		
338.2	4.943	27.45		
343.2	5.613	31.17		
348.2	6.351	35.28		
353.2	7.163	39.79		

#### Silver Bromate

COMPONENTS:	EVALUATORS:	·
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	H. Miyamoto	M. Salomon
	Niigata University	US Army, ET & DL
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata, Japan	Ft. Monmouth, NJ, USA
	July, 1987	

### MULTICOMPONENT SYSTEMS

### Solubility in inorganic systems.

The existing data constitute mainly ternary systems where  $AgBrO_3$  is the only saturating component. The only studies reporting the solubility of  $AgBrO_3$  in the presence of a second saturating component are those of Ricci et al. where the second saturating component is either  $NaBrO_3(11)$  or  $KBrO_3(13)$ . For the multicomponent systems in which  $AgBrO_3$  is the only saturating component, insufficient information prevents direct comparisons due to (1) existence of only one study, (2) use of different concentration units, (3) too wide a difference in the concentration of the non-saturating component, and (4) significant differences in results when two independent studies can be compared. For example, the solubility of  $AgBrO_3$  in the presence of  $KNO_3$  has been reported by Dalton et al. (7), Vosburgh and Cogswell (10), and by Keefer et al. (43). The only results which can be compared are those from (7) and (10) which are based on mass units, but as seen in Figure 1 below, the differences between these two studies are large thereby preventing comparisons. We can only point out that for pure water, the solubility of  $AgBrO_3(0.008062 \mod kg^{-1})$  reported in (7) is significantly lower than the **recommended** value given in Table 4, whereas Vosburgh and Cogswell's value (0.00827 mol kg<sup>-1</sup>) is almost identical to this **recommended** value.



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72 Silver Bromate		
COMPONENTS:	EVALUATORS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	H. Miyamoto	M. Salomon
(2) Organic solvents	Niigata University	US Army, ET & DL
(3) Water; H <sub>2</sub> O; [7732-18-5]	Niigata, Japan July, 1987	Ft. Monmouth, NJ, USA

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#### Solubility in aqueous-organic mixed solvents.

For T = 298.2 K, there are four major groups of investigators whose results may be compared. In general, when comparisons are made, it is found that there is excellent agreement between the results of Owen (8), Neuman (9), and Davies and Monk (15). The studies by Miyamoto et al. (specific references given below) are consistently higher by up to 20 % than those from (8, 9 and 15), and in arriving at the final smoothed solubilities below, the data of Miyamoto et al. were omitted. The source of these differences can probably be attributed to the experimental method: Miyamoto et al. consistently analyzed the saturated solutions by argentometric titration whereas most other studies used gravimetric, iodometric or radio assay methods. There are two publications by Dash et al. which have been rejected on the basis that no solubility data are reported: these authors used standard half-cell potentials to compute the solubility products of AgBrO<sub>3</sub> in water-glycerol (40) and water-urea (41) mixtures. Below, we discuss only those systems where two or more studies are available for comparisons, and the reader is referred to the compilations for solubility data in mixed water-organic solvents which have been published only in one study. In all cases below, we consider solubilities only at 298.2 K based on mol dm<sup>-3</sup> units, and the data were fitted by a relative least squares method to a simple power series smoothing equation. For temperatures other than 298.2 K, the compilations for the publications by Miyamoto et al. should be consulted. It is difficult to decide whether the smoothed solubilities given below should be designated as tentative or recommended. The smoothing equations generally predict a solubility in pure water of around 0.0081 to 0.0082 mol dm<sup>-3</sup> which is in agreement with the tentative value given in Table 4, but is slightly lower than that calculated from the recommended value of 0.00831 mol kg<sup>-1</sup> which correlates to 0.00826 mol dm<sup>-3</sup> using the density of 0.9987 g  $cc^{-1}$  from (8). In light of this uncertainty, we arrive at the conservative conclusion that the smoothed solubilities given below be designated as tentative values.

(i) Water-methanol mixtures. The 298.2 K solubility data of Miyamoto (28) were rejected, and the remaining 22 data points from (8, 9, 15) were fitted to the following smoothing equation.

 $c_1$ /mmol dm<sup>-3</sup> = 8.086 - 0.31656(100 $w_2$ ) + 0.0063338(100 $w_2$ )<sup>2</sup> - 7.2542 x 10<sup>-5</sup>(100 $w_2$ )<sup>3</sup> + 3.5555 x 10<sup>-7</sup>(100 $w_2$ )<sup>4</sup>

In this equation,  $100w_2$  is the content of the organic component in mass %, and the standard error of estimate for the calculated solubilities is  $\sigma = 0.02_5$ . Note that the solubilities  $c_1$  in this smoothing equation are based on mmol dm<sup>-3</sup> units, and  $100w_2(max) = 60$  mass %.

(11) Water-ethanol mixtures. The 298.2 K solubility data of Miyamoto and Koizumi (20) were rejected, and the remaining 20 data points from (8, 9, 15) were fitted to the following smoothing equation ( $\sigma = 0.042$ )

 $c_1$ /mmol dm<sup>-3</sup> = 8.041 - 0.30081(100 $w_2$ ) + 0.0052252(100 $w_2$ )<sup>2</sup> - 3.8209 x 10<sup>-5</sup>(100 $w_2$ )<sup>3</sup> + 3.1101 x 10<sup>-9</sup>(100 $w_2$ )<sup>4</sup>

where  $100w_2(max) = 50$  mass %. For solubilities at 293.2 K and 303.2 K, the compilation of (20) should be consulted.

(iii) Water-ethylene glycol mixtures. The 10 data points at 298.2 K from Owen (8) and Davies and Monk (15) were fitted to the following smoothing equation ( $\sigma = 0.0086$ ) where  $100w_2(max) = 70$  mass %.

 $c_1$ /mmol dm<sup>-3</sup> = 8.117 - 0.091914(100 $w_2$ ) + 0.00065184(100 $w_2$ )<sup>2</sup> - 3.70002 x 10<sup>-6</sup>(100 $w_2$ )<sup>3</sup>

Solubility data at 293.2 K and 303.2 K are given in (29).

(iv) Water-1-propanol mixtures. The 15 data points from (8, 9) were fitted to the following smoothing equation ( $\sigma = 0.019$ ) where  $100w_2(\max) = 65 \mod \%$ .

 $c_1$ /mmol dm<sup>-3</sup> = 8.101 - 0.28549(100 $w_2$ ) + 0.0068782(100 $w_2$ )<sup>2</sup> - 1.09640 x 10<sup>-4</sup>(100 $w_2$ )<sup>3</sup> + 6.9007 x 10<sup>-7</sup>(100 $w_2$ )<sup>4</sup>

Solubility data at 293.2 K and 303.2 K are given in (23).

COMPONENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]
(2) Organic solvents
(3) Water; H <sub>2</sub> O; [7732-18-5]

(v) Water-2-propanol mixtures. There are two publications reporting the solubility of AgBrO<sub>3</sub> in these mixed solvents at 298.2 K (9, 25), and only the 10 data points of Neuman were used to arrive at the following smoothing equation ( $\sigma = 0.010$ ) where  $100w_2(\max) = 50$  mass %.

 $c_1$ /mmol dm<sup>-3</sup> = 8.176 - 0.35344(100 $w_2$ ) + 0.010106(100 $w_2$ )<sup>2</sup> - 1.7698 x 10<sup>-4</sup>(100 $w_2$ )<sup>3</sup> + 1.25174 x 10<sup>-6</sup>(100 $w_2$ )<sup>4</sup>

(vi) Water-glycerol mixtures. For glycerol contents up to  $100w_2(max) = 80$  mass %, the 12 data points from (8 and 15) were fitted to the following smoothing equation ( $\sigma = 0.0064$ ).

 $c_1$ /mmol dm<sup>-3</sup> = 8.115 - 0.029759(100 $w_2$ ) - 1.8548 x 10<sup>-4</sup>(100 $w_2$ )<sup>2</sup> + 5.4939 x 10<sup>-6</sup>(100 $w_2$ )<sup>3</sup> - 5.9074 x 10<sup>-8</sup>(100 $w_2$ )<sup>4</sup>

For solubilities up to 90 mass % glycerol at 293.2 K and 303.2 K, see the compilation of Miyamoto's study (26).

(vii) Water -1,4-dioxane mixtures. The solubility of  $AgBrO_3$  in aqueous mixtures with 1,4-dioxane were reported in (15, 16, 45 and 46). The data of Monk (45) are in mol kg<sup>-1</sup> units, and the data of Koizumi and Miyamoto (16) and Davies and Monk (15) are in mol dm<sup>-3</sup> units, but these data cannot be compared since those in (16) are 10-20 % higher than those in (15). The results of Dash et al. (46) are rejected for several reasons. While Dash et al. obviously measured the solubility of  $AgBrO_3$  in 10, 20 and 40 mass % dioxane solutions, the results are not given in the paper. These authors used the solubility data to compute thermodynamic solubility products, but there is some confusion as to whether or not the reported solubility products are indeed thermodynamic values. The compilers (H. Miyamoto and E.M. Woolley) interpret Dash's solubility products, given as a smoothing equation as a function of temperature, as referring to concentration solubility product constants. In view of these problems in clarity and the absence of numerical solubility data, this paper (46) is rejected, and a compilation is not given. The paper by Dash et al. (47) was also rejected and not compiled as it reports calculated solubility products based on standard half-cell potentials.

(vili) Water-acetone mixtures. The 10 data points from (8, 15) for  $100w_2(max) = 40$  mass % were fitted to the following smoothing equation ( $\sigma = 0.086$ ).

 $c_1/\text{mmol dm}^{-3} = 8.106 - 0.19804(100w_2) - 0.0035492(100w_2)^2 + 2.3152 \times 10^{-4}(100w_2)^3 - 2.8521 \times 10^{-6}(100w_2)^4$ 

For  $100w_2(max) = 56$  mass %, and for temperatures of 293.2 K and 303.2 K, the compilation of the paper by Miyamoto and Koizumi should be consulted.

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# Silver Bromate

COMPONENTS:	EVALUATORS:	· · · · · · · · · · · · · · · · · · ·	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	H. Miyamoto	M. Salomon	
	Niigata University	US Army, ET & DL	
(2) Water; H <sub>2</sub> O; [7732-18-5]	Niigata, Japan	Ft. Monmouth, NJ, USA	
	July, 1987		
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COMPONENTS:	EVALUATORS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	H. Miyamoto Niigata University	M. Salomon US Army, ET & DL
(2) Deuterium oxide (water-d <sub>2</sub> ); D <sub>2</sub> O; [7789-20-0]	Niigata, Japan July, 1987	Ft. Monmouth, NJ, USA

The solubility of  $AgBrO_3$  in deuterium oxide has been reported by Ramette et al. in two publications (1, 2). In both publications, the  $D_2O$  used was stated to be 99.5 % pure, and small additions of  $HClO_4$  were used to surpress hydrolysis (evaluators' note: Ramette et al. are the only researchers to mention the possible hydrolysis of  $AgBrO_3$  solutions).

In (1) Ramette and Dratz determined the solubility of AgBrO<sub>3</sub> in deuterium oxide containing 0 to 0.1 mol dm<sup>-3</sup> LiClO<sub>4</sub> and 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub> at 289.9, 298.2, and 308.2 K. Thermodynamic solubility products were calculated using the Debye-Hückel equation. At 298.2 K, these authors reported a solubility of 0.00676 mol dm<sup>-3</sup> in D<sub>2</sub>O containing 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub>, and a thermodynamic solubility product of  $10^{-4.414}$  (i.e.  $K_{s0} = 3.855 \times 10^{-5}$  mol<sup>2</sup> dm<sup>-6</sup>, evaluators).

In (2) Ramette and Spencer measured the solubility of AgBrO<sub>3</sub> at 298.2 K in 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub> solutions containing either LiNO<sub>3</sub> or LiClO<sub>4</sub> up to 0.3 mol dm<sup>-3</sup>. The solubility was reported as 0.00678 mol dm<sup>-3</sup> in the solvent (i.e. containing 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub>), and using the Davies equation to calculate activity coefficients, the authors reported a value of  $10^{-4.412}$  for the thermodynamic solubility product (i.e.  $K_{s0} = 3.872 \times 10^{-5} \text{ mol}^2 \text{ dm}^{-6}$  in 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub> in D<sub>2</sub>O).

For 298.2 K in 99.5 %  $D_2O$  containing 0.0001 mol dm<sup>-3</sup> HClO<sub>4</sub>, the evaluators computed the following averages which are designated as tentative values.

 $AgBrO_3$  solubility = 0.00677 mol dm<sup>-3</sup>

 $K_{s0} = 3.86 \text{ x } 10^{-5} \text{ mol}^2 \text{ dm}^{-6}$ 

#### REFERENCES

1. Ramette, R. W.; Dratz, E. A. J. Phys. Chem. 1963, 67, 940.

2. Ramette, R. W.; Spencer, J. B. J. Phys. Chem. 1963, 67, 944.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Böttger, W. Z. Phys. Chem. <u>1903</u> , 46, 521–619.
VARIABLES:	PREPARED BY:
T/K = 293.09	H. Miyamoto and E. M. Woolley

The solubility of AgBrO<sub>3</sub> in water at 19.94°C was determined from measurements of the electrolytic conductivities of saturated solutions,  $\kappa(sln)$ , and of pure water,  $\kappa(water)$ . For pure water,  $\kappa(water) = 9.3 \times 10^{-7}$ S cm<sup>-1</sup>, and for saturated solutions, the electrolytic conductivities are given in the following table.

equilibration time	κ(sln)
hours	106S cm-1
26	665.0
8	663.8
11	663.8
8	664.2
19	663.5
	663.3
average:	663.9

The solubility S was calculated from the following two equations.

 $\kappa (AgBrO_3) = \kappa (sln) - \kappa (water)$  $S = \frac{1000 \varkappa (AgBrO_3)}{(\lambda^{\infty} (Ag^{*}) + \lambda^{\infty} (BrO_{3}))}$ 

For Ag<sup>+</sup> and BrO<sub>3</sub><sup>-</sup>,  $\lambda \infty = 57.0$  and 48.3 S cm<sup>2</sup> mol<sup>-1</sup>, respectively, and the solubility is thus 0.00630<sub>5</sub> mol dm<sup>-3</sup>, and  $K_{s0} = S^2 = 3.97 \text{ x } 10^{-5} \text{ mol}^2 \text{ dm}^{-6}$ .

AUXILIARY II	NFORMATION
METHOD/APPARATUS/PROCEDURE: Conductivity method. The conductivity cells which employed Pt electrodes was designed to prevent entrapment of air bubbles. After sealing, the entire cell was immersed in a water bath and rotated in the dark. Equilibrium was taken when the conductivity remained constant within experimental error (usually within 20-30 min). The bridge and the thermometer were calibrated, and the cell constants determined with 0.010 mol dm <sup>-3</sup> KCl solution.	SOURCE AND PURITY OF MATERIALS: Analytically pure chemicals (Merck) were used. AgBrO <sub>3</sub> was precipitated from AgNO <sub>3</sub> and KBrO <sub>3</sub> solutions. The ppt was stored in a dark grey bottle in a dark place. KCl was purified by precipitation from a saturated solution with alcohol. Laboratory distilled was was redistilled from a tin-platted still, and stored in a flask fitted with a drying tube containing NaOH and CaO.
	ESTIMATED ERROR: $\kappa$ : accuracy ± 1 x 10 <sup>-6</sup> S cm <sup>-1</sup> (compilers). Soly: precision ± 15 % (compilers). Temp: accuracy ± 0.01 to 0.02 K
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Longi, A.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Gazz. Chim. Ital. <u>1883</u> , 13, 87-9.
VARIABLES:	PREPARED BY:
T/K = 298	B. Scrosati

The author reported that at 25°C, one g of AgBrO<sub>3</sub> dissolves in 595.1 g water. This is equivalent to 0.00712 mol kg<sup>-1</sup> (compiler).

The author also reported that at 25°C, one g AgBrO<sub>3</sub> dissolves in 597.73 cm<sup>3</sup> water, and this is equivalent to 0.00710 mol dm<sup>-3</sup> (compiler).

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Nothing specified, but the solubility was probably detd gravimetrically after evaporation to dryness.	Nothing specified.	

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS: Whitby, G. S.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Z. Anorg. Chem. <u>1910</u> , 67, 107-9 and 62-4.
VARIABLES:	PREPARED BY:
T/K = 300	H. Miyamoto and E. M. Woolley

# EXPERIMENTAL DATA:

The solubility of  $AgBrO_3$  in water at 27°C was given as 1.71 g dm<sup>-3</sup>. This is equivalent to 0.00725 mol dm<sup>-3</sup> (compilers).

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Complete details given in the compilation of this author's simultaneous study of the system AgIO <sub>3</sub> -water.	Nothing specified.	
The detection limit of the colorimetric determination of Ag stated to be 4 x $10^{-5}$ g Ag dm <sup>-3</sup> (see the AgIO-H <sub>2</sub> O compilation).	ESTIMATED ERROR: Soly: precision ± 5 % (compilers). Temp: nothing specified.	

78	Silver E	Bromate	
COMPONENTS:		ORIGINAL MEASUREMENTS:	
1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Reedy, J. H.	
(2) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Chem. Soc. <u>1921</u> , 43, 1440-5.	
VARIABLES:		PREPARED BY:	
T/K = 298 - 363		H. Miyamoto	
EXPERIMENTAL DATA:			
	sol	ubility of AgBrO <sub>3</sub> <sup>a</sup>	
t/ºC	g/100	$10^{3} \text{ mol kg}^{-1}$	
25	0.1	96 8.31	
30	0.2	9.63	
35	0.2	.69 11.41	
40	0.3	16 13.40	
45	0.3	15.74	
50	0.4	133 18.36	
55	0.4	97 21.08	
60	0.5	24.18	
65	0.6	548 27.48	
70	0.7	35 31.17	
75	0.8	32 35.29	
80	· 0.9	36 39.70	
85	1.0	955 44.75	
90	1.3	56.20	
Molalities calculated by the compiler.			
Based on emf measurements, the author report	rted a solub	ility of 0.00827 mol dm <sup>-3</sup> at $25^{\circ}$ C.	
AUX	ILIARY IN	FORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Primary method was standard isothermal met	hod where	Technical grade AgBrOs prend by reaction of excess	
rimary method was standard isothermal method where		bromine with AgNO, solution The product was	
were removed placed in glass stoppered hottl	les and	purified by extraction with hot water, recrystallized.	
weighed The solubilities were detd indomet	rically by	washed and dried in vacuum. The purity was 99.6 to	
adding excess KI dil HCl and then titrating	with	100 % detd gravimetrically. Two crystalline forms of	
standard this sulfate solution. The solubility	at 250C	A oBrOs were obtained a metastable "hair form" stable	
was also determined by emf measurements on	the cell:	above 98.5°C, and a stable "tetragonal" form stable	
		below 98.5°C.	
Ag,AgBrO <sub>3</sub> (s)   KBrO <sub>3</sub> (c), AgBrO <sub>3</sub> (sa    con KNO <sub>3</sub>    AgNO <sub>3</sub> (c)   Ag	td)		
For $c = 0.1$ mol dm <sup>-3</sup> , the emf of this cell is	0.1193 V.	ESTIMATED ERROR:	
Assuming $KBrO_3$ is 82.5 % dissociated and A 98 % dissociated, the soly was calcd to be 0.0 dm <sup>-3</sup> .	gBrO <sub>3</sub> is 0827 mol	Nothing specified.	
		REFERENCES:	
Four data points for the solv of metastable A	gBrO <sub>2</sub>		

Four data points for the soly of metastable  $AgBrO_3$ were reported graphically. They show increased soly, as expected, and appear to be associated with a large experimental error.

COMPONENTS: (1) Silver bromate; AgBrO <sub>8</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS: Lei'chuk, Yu. L.
<ul> <li>(2) Lithium sulfate; Li<sub>2</sub>SO<sub>4</sub>; [10377-48-7]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	Zh. Neorg. Khim. <u>1958</u> , 3, 2453-7: Russ. J. Inorg. Chem. (Engl. Transl.) <u>1958</u> , 3, 29-35.
VARIABLES: Concentration of lithium sulfate T/K = 298	PREPARED BY: E. M. Woolley
EVDEDIMENTAL DATA.	

concn of Li <sub>2</sub> SO <sub>4</sub> mol dm <sup>-3</sup>	soly, S, of AgBrO <sub>3</sub> mmol dm <sup>-3</sup>	105K <sub>s0</sub> = S <sup>2</sup> mol <sup>2</sup> dm <sup>-6</sup>	105K°.0	y±ª
0	8.25	6.80	5.50	0.900
0.001	8.26	6.82	5.43	0.892
0.003	8.54	7.29	5.50	0.869
0.010	9.03	8.15	5.45	0.818
0.030	9.90	9.80	5.37	0.740
0.100	11.5	13.20	5.20	0.628
0.300	14.6	21.30	5.66	0.516
1.000	18.3	33.50	5.50	0.405

<sup>a</sup>Mean molar activity coefficients  $y_{\pm}$  calculated from an unspecified form of the Debye-Hückel equation using an ion size parameter of 2.155 x 10<sup>-10</sup> m. Thermodynamic solubility product  $K_{s0}^{o}$  calculated from  $y_{\pm}^{2}K_{s0}$ .

AUXILIARY IN	IFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The method follows that of ref. (1). AgBrO <sub>3</sub> crystals and Li <sub>2</sub> SO <sub>4</sub> solutions were placed in brown bottles. The mixtures were vigorously stirred for 6-8 hours in a thermostat at 25°C. The Ag content of saturated solutions was determined gravimetrically as AgCl, and the bromate concentration determined iodometrically. Samples were prepared in duplicate, and the solubility values in the above table are averages of the four analyses for each specified Li <sub>2</sub> SO <sub>4</sub> concentration.	AgBrO <sub>3</sub> prepared by dropwise addition of 5 % KBrO <sub>3</sub> solution to cold 10 % AgNO <sub>3</sub> solution (1). The precipitate was washed repeatedly, recrystallized, washed with doubly distilled water, air dried and stored in a dark glass jar. Li <sub>2</sub> SO <sub>4</sub> •H <sub>2</sub> O prepared from equivalent amounts of Li <sub>2</sub> CO <sub>3</sub> and H <sub>2</sub> SO <sub>4</sub> . Doubly distilled water was used to prepare the solutions.
	ESTIMATED ERROR:
	Soly: nothing specified.
	Temp: precision $\pm$ 0.1 K as in (1).
	REFERENCES: 1. Tananaev, I.V.; Lel'chuk, Yu. L.; Petrovitskaya, B.K. Zh. Obshch. Khim. <u>1949</u> , 19, 1207: J. General Chem. USSR (Engl. Transl.) <u>1949</u> , 19, 1201.

Silver	Bromate
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COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Sodium bromate; NaBrO <sub>3</sub> ; [7789-38-0] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Ricci, J. E.; Aleshnick, J. J. J. Am. Chem. Soc. <u>1944</u> , 66, 980-3.
VARIABLES: Composition T/K = 278, 298 and 323	PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA:	

	NaBrO <sub>3</sub>	content	AgBrO <sub>3</sub>	content	density	nature of the
t∕⁰C	mass %	mol kg-1a	mass %	mol kg-1a	kg dm-3	solid phase <sup>c</sup>
5	21.41	1.805			1.192	N
	21.32	1.796			1,190	SSI + AN
			0.0095 <sup>b</sup>	0.000384	0.9998	Α
25	28.26	2.611			1.264	N
	28.26	2.611			1.264	SSI
	28.24	2.608			1.261	SSI
	28.21	2.604			1.262	SSI
	28.16	2.598			1.261	SSI
	28.14	2.595			1.260	SSI
	28.08	2.587			1.260	SSI
	27.97ь	2.573			1.260	SSI + AN
	27.84	2.557			1.257	AN
	27.78	2.549			1.257	AN
	27.66	2.534			1.256	AN
	27.41	2.502			1.252	AN
	27.35	2.495			1.251	AN
	27.05	2.457			1.248	AN
	26.42	2.380			1.241	AN
	25.36	2.252			1.232	AN
	24.32	2.130			1.220	AN
	22.71	1.947			1.203	AN

#### **AUXILIARY INFORMATION**

#### SOURCE AND PURITY OF MATERIALS:

METHOD/APPARATUS/PROCEDURE: Ternary complexes were prepared by weight using distilled water, and c.p. grade NaBrO<sub>3</sub> and AgBrO<sub>3</sub>. The complexes were stirred for periods of 2 or 8 weeks, and attainment of equilibrium was established in almost all cases by repeated analysis of the solution after further stirring. In the last one or two of the the mixtures at 25°C in the data table (see next page), AgBrO<sub>3</sub> was determined gravimetrically as AgBr after reduction with NaNO<sub>2</sub>

NaBrO<sub>3</sub> was determined gravimetrically after evaporation of the solution to dryness.

# C.p. grade AgBrO<sub>3</sub> and c.p. grade NaBrO<sub>3</sub> were used. The purity of NaBrO<sub>3</sub> was found to be $100 \pm 0.1$ %, and the purity of the AgBrO<sub>3</sub> was found to be $\pm$ 98.2 % silver bromate and 1.8 % sodium bromate.

#### **ESTIMATED ERROR:** Soly: AgBrO<sub>3</sub> precision ± 0.004 mass %. NaBrO<sub>3</sub> precision ± 0.02 mass %.

Temp: nothing specified.

**REFERENCES:** 

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS: Ricci, J. E.; Aleshnick, J. J.
(2) Sodium bromate; NaBrO <sub>3</sub> ; [7789-38-0]	J. Am. Chem. Soc. <u>1944</u> , 66, 980-3.
(3) Water; H <sub>2</sub> O; [7732-18-5]	

### EXPERIMENTAL DATA: (continued......)

	NaBrO <sub>3</sub> content		AgBrO <sub>3</sub>	content	density	nature of the
t/ºC	mass %	mol kg-1a	mass %	mol kg-1a	kg dm-3	solid phase <sup>c</sup>
25	16.99	1.356			1.143	SSII
	13.04	0.994			1.108	SSII
	10.28	0.759			1.079	SSII
	8.39	0.607			1.062	SSII
	7.17	0.512	0.01	0.0004	1.051	SSII
	3.92	0.270	0.03	0.0013	1.025	SSII
			0.204ª	0.00867	0.9985	Α
50	35.64	3.670			1.341	N
	35.24•	3.606			1.334	SSI + AN
	35.05	3.576			1.334	AN
	34.73	3.526			1.331	AN
	34.57	3.501				AN
	28.77	2.677			1.258	SSII
	23.32	2.015			1.196	SSII
			0.430 <sup>d</sup>	0.0183	0.9934	Α

\*Molalities calculated by the compiler.

<sup>b</sup>Average of 15 determinations.

cSolid phase designations:  $N = NaBrO_3$ ;  $A = AgBrO_3$ ; SSI is a solid solution containing up to 2.5 to 3.0 mass % AgBrO<sub>3</sub>, and SSII is a solid solution containing AgBrO<sub>3</sub> from 61 to 95 mass.

<sup>d</sup>The solubilities of AgBrO<sub>3</sub> in pure water were determined with c.p. grade AgBrO<sub>3</sub> which was repeatedly washed with considerable quantities of water. The purity of about 99.7 % was finally obtained, but the authors stated that great accuracy cannot be claimed for these solubilities.

•Average of three determinations.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS: Lel'chuk, Yu. L.; Surina, L. V.; Barkhatova, V. I.
<ul> <li>(2) Sodium nitrate; NaNO<sub>3</sub>; [7631-99-4]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	Zh. Obshch. Khim. <u>1955</u> , 25, 1685-93: J. General Chem. USSR (Engl. Transl.) <u>1955</u> , 25, 1641-6.
VARIABLES: Concentration of sodium nitrate T/K = 298	PREPARED BY: E. M. Woolley and H. Miyamoto

The solubilities reported below are from the source paper in Zh. Obshch. Khim., but these data were probably originally reported in reference 1 below.

concn of NaNO <sub>3</sub>	soly, S, of AgBrO <sub>3</sub>	$10^{5}K_{s0} = S^{2}$	
mol dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>	105K0 <sub>20</sub> 2
0.001	8.22	6.76	6.08
0.003	8.51	6.91	5.49
0.010	8.50	7.23	5.41
0.030	9.27	8.59	5.72
0.100	10.08	10.2	5.44
0.300	11.38	13.0	5.09
1.000	14.8	21.9	5.50

<sup>a</sup>Mean molar activity coefficients  $y_{\pm}$  calculated from the extended Debye-Hückel equation, and the thermodynamic solubility product  $K^{0}_{s0}$  calculated from  $y_{\pm}^{2}K_{s0}$ .

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
AgBrO <sub>3</sub> crystals and aqueous NaNO <sub>3</sub> solutions were placed in 400-500 cm <sup>3</sup> paraffined brown bottles. The mixtures were vigorously stirred for 8 hours in a thermostat at 25°C. Details of the solubility analysis	AgBrO <sub>3</sub> prepared by dropwise addition of KBrO <sub>3</sub> solution to AgNO <sub>3</sub> solution. Sodium nitrate was recrystallized twice.		
given in ref. (1), and probably involved gravimetric Ag analysis as AgCl, and iodometric bromate analysis.	Doubly distilled water was used to prepare the solutions.		
	ESTIMATED ERROR:		
	Soly: nothing specified.		
	Temp: precision ± 0.1 K.		
	REFERENCES:		
	<ol> <li>Lel'chuk, Yu. L.; Sasonko, S. M.</li> <li>Izv. Tomsk. Politekhn. Inst. <u>1952</u>, 71, 52.</li> </ol>		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Dalton, R. H.; Pomeroy, R.; Weymouth, L. E.
(2) Sodium sulfate; Na <sub>2</sub> SO <sub>4</sub> ; [7757-82-6]	J. Am. Chem. Soc. <u>1924</u> , 46, 60-4.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Concentration of sodium sulfate	PREPARED BY:
T/K = 298.15	H. Miyamoto
EVDEDIMENTAL DATA.	

number of experiments	Na <sub>2</sub> SO <sub>4</sub> concn mol kg <sup>-1</sup>	AgBrO <sub>3</sub> soly mmol kg <sup>-1</sup>	av deviation %	density kg dm- <sup>3</sup>
12	0	8.062ª	0.14	0.9990
2	0.05	9.965	0.02	1.0025
4	0.10	10.973	0.17	1.0059
3	1.00	18.619	0.28	1.0622

\*This value in pure water obtained using three separate samples of AgBrO3:

1. soly = 8.013 mmol dm<sup>-3</sup>, average of 5 values with ave deviation of 0.001 mmol dm<sup>-3</sup>.

2. soly = 8.097 mmol dm<sup>-3</sup>, average of 5 values with ave deviation of 0.003 mmol dm<sup>-3</sup>.

3. soly = 8.097 mmol dm<sup>-3</sup>, average of 2 values with ave deviation of 0.003 mmol dm<sup>-3</sup>.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Equilibrium was reached by rotating solid AgBrO <sub>3</sub> with Na <sub>2</sub> SO <sub>2</sub> solutions in a thermostat at 25.00°C for 15 hours. Equilibrium was always reached from both above and below 25°C, and no significant differences were observed. Saturated solutions were filtered, and about 250 cm <sup>3</sup> portions weighed to determine densities. To these solutions were added 6 cm <sup>3</sup> of 6 mol dm <sup>-3</sup> and 7 mol dm <sup>-3</sup> NH <sub>4</sub> Br per mol Ag. These solutions were heated to near boiling while air was continuously passed through the solutions. The precipitated AgBr was filtered, washed, dried at 210-220°C, cooled, and weighed.	AgBrO <sub>3</sub> prepd by pouring a hot solution of 0.6 mol dm <sup>-3</sup> KBrO <sub>3</sub> into an excess of cold 1.3 mol dm <sup>-3</sup> solution of AgNO <sub>3</sub> . The precipitate was collected on a hardened filter, washed, and dried at (1) 50-60°C or (2) at 105°C. A preparation as in (1) was used to prepare a third solid sample by recrystallizing from boiling water followed by drying at 105°C. Na <sub>2</sub> SO <sub>4</sub> was dried, and it's halide content stated to be 0.011 %.			
	ESTIMATED ERROR:			
	Soly: see table and footnote a above.			
	Temp: precision $\pm$ 0.05 K.			
	REFERENCES:			

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Lel'chuk, Yu. L.		
(2) Sodium sulfate; Na <sub>2</sub> SO <sub>4</sub> ; [7757-82-6]		Zh. Neorg. Khim. <u>1958</u> , 3, 2453-7: Russ. J. Inorg.		
(3) Water; H <sub>2</sub> O; [7732-18-5]		Chem. (Engl. Iransi.)	) <u>1936,</u> 3, 29-33.	
	<u> </u>			
VARIABLES:	· · · · · · · · · · · · · · · · · · ·		PREPARED BY:	
T/K = 298	sodium suirate		E. M. Woolley	
EXPERIMENTA	L DATA:		1,,,,,	
concn of	soly, S, of			
Na <sub>2</sub> SO <sub>4</sub>	AgBrOs	$10^{5}K_{*0} = S^{2}$		
mol dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>	105K0.0	У±в
				_
0	8.25	6.80	5.50	0.900
0.001	8.47	7.17	5.66	0.889
0.003	8.78	7.71	5.77	0.865
0.010	9.37	8.78	5.78	0.811
0.030	10.5	11.00	5.81	0.727
0.100	12.3	15.10	5.45	0.601
0.300	16.0	25.50	5.63	0.470
1.000	22.0	48.40	5.50	0.337
		AUXILIARY IN	FORMATION	
METHOD/APPA	ARATUS/PROCED	URE:	SOURCE AND PURI	TY OF MATERIALS:
The method foll	ows that of ref. (1)	. AgBrO <sub>3</sub> crystals	AgBrO <sub>3</sub> prepared by d	lropwise addition of 5 % KBrO <sub>3</sub>
and Na <sub>2</sub> SO <sub>4</sub> solu	tions were placed i	n brown bottles.	solution to cold 10 %	$AgNO_3$ solution (1). The
The mixtures we	ere vigorously stirre	ed for 6-8 hours in a	precipitate was washed	l repeatedly, recrystallized,
thermostat at 25	<sup>o</sup> C. The Ag conter	at of saturated	washed with doubly di	istilled water, air dried and
solutions was de the bromate con	termined gravimetr centration determin	ically as AgCl, and ed iodometrically.	stored in a dark glass jar. Na <sub>2</sub> SO <sub>4</sub> purified by recrystallization two time.	
Samples were pr	epared in duplicate	, and the solubility		
values in the abo analyses for each	ove table are averaged a specified Na <sub>2</sub> SO <sub>4</sub>	ges of the four concentration.	Doubly distilled water was used to prepare the solutions.	
			ESTIMATED ERROR:	
			Soly: nothing specified Temp: precision ± 0.1	l. K as in (1).
			REFERENCES: 1. Tananaev, I.V.; Lel' Zh. Obshch. Khim. Chem. USSR (Engl.	chuk, Yu. L.; Petrovitskaya, B.K. <u>1949,</u> 19, 1207: J. General . Transl.) <u>1949</u> , 19, 1201.

COMPONENTS:			ORIGINAL M	EASUREMENT	S:
<ul> <li>(1) Silver bromate; AgBrO<sub>3</sub>; [7783-89-3]</li> <li>(2) Potassium bromate; KBrO<sub>3</sub>; [7758-01-2]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>VARIABLES:</li> <li>Concentration of potassium bromate</li> <li>T/K = 298.2</li> </ul>		Lel'chuk, Yu. L.; Surnina, L. V.; Barkhatova, V. I.			
		Zh. Obshch.	Khim. <u>1955,</u> 25,	, 1685-93: J. General	
		Chem. <u>1955</u> , 2	25, 1641-6.		
		PREPARED BY: H. Mivamoto and E. M. Woolley			
EXPERIMENTAL D	ATA:				
KBrO <sub>3</sub> concn	AgBrO	solubility/mmol d	m-3		10 <sup>5</sup> K <sub>so</sub> *
mol dm-3	exp. 1	exp. 2	exp. 3	mean	mol <sup>2</sup> dm <sup>-6</sup>
0	8.244	8.252	8.249	8.25	6.80
0.001	7.25	7.33	7.37	7.32	6.09
0.003	5.29	5.31	5.28	5.29	4.38
0.010	3.98	4.01	3.97	3.99	5.58
0.030	2.48	2.47	2.52	2.49	8.09
0.100	0.975	1.10	1.10	1.06	10.7
0.300	0.700	0.712	0.696	0.703	21.1
<ul> <li>Solubility products</li> </ul>	calculated from	S{S + [KBrO <sub>3</sub> ]} wh	ere S = solubilit	y of AgBrO <sub>3</sub> .	1
		AUXILIARY I	NFORMATION		
METHOD/APPARATUS/PROCEDURE: Method completely described in the compilation of Lel'chuk's study on the Li <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O and the		SOURCE AND PURITY OF MATERIALS: KBrO <sub>3</sub> prepd from KOH and Br <sub>2</sub> . All other details found in the compilations cited on the left.			
NaNO <sub>3</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O systems.		ESTIMATED I Soly: from abo %.	ERROR: ve table, precisi	on is about ± 0.2 % to 1	

COMPONENTS:		ORIGINAL MEASUREMENTS:		
<ol> <li>(1) Silver bromate; AgBrO<sub>3</sub>; [7783-89-3]</li> <li>(2) Potassium bromate; KBrO<sub>3</sub>; [7758-01-2]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> </ol>		Noyes, A. A.		
		Z. Phys. Chem. <u>1890</u> , 6, 241-67.		
VARIABLES: Concentration of potassium bromate T/K = 297.7		PREPARED BY:		
		H. Miyamoto		
EXPERIMENTAL DATA:				
	KBrO <sub>3</sub> concn	AgBrO <sub>3</sub> soly		
mmol dm-3 0 8.50		mmol dm-3		
		8.10		
		5.19		
34.6		2.27		
	AUXILIARY II	NFORMATION		
METHOD/APPARATUS/PROCEDURE: Excess AgBrO <sub>3</sub> in aq KBrO <sub>3</sub> thermostated at 24.5°C for		SOURCE AND PURITY OF MATERIALS: or Nothing specified.		
				several days and frequently
detd gravimetrically as AgBr.		ESTIMATED ERROR:		
		Nothing specified.		

COMPONENTS:	ORIGINAL MEASUREMENTS:				
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Dalton, R. H.; Pomeroy, R.; Weymouth, L. E.				
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	J. Am. Chem. Soc. <u>1924</u> , 46, 60-4.				
(3) Water; H <sub>2</sub> O; [7732-18-5]					
	DEPADED DV				
Concentration of potassium nitrate	FREFARED DI:				
T/K = 298.15	H. Miyamoto				
EXPERIMENTAL DATA:					
number of KNO3 concn	AgBrO <sub>3</sub> solv av deviation				
experiments mol kg <sup>-1</sup>	mmol kg <sup>-1</sup> %				
12 0	8.062ª 0.14				
2 0.040	9.12 0.12				
3 0.100	9.12 0.29				
3 0.200	11.06 0.04				
3 0.393	12.66 0.18				
This value in pure water obtained using three separate	arate samples of AgBrO <sub>3</sub> .				
<ol> <li>soly = 8.097 mmol dm<sup>-3</sup>, average of 5 values with ave deviation of 0.003 mmol dm<sup>-3</sup>.</li> <li>soly = 8.097 mmol dm<sup>-3</sup>, average of 2 values with ave deviation of 0.003 mmol dm<sup>-3</sup>.</li> </ol>					
AUXILIAI	RY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
Equilibrium was reached by rotating solid AgBrO <sub>3</sub> KNO <sub>3</sub> solutions in a thermostat at 25.00°C for 15 hours. Equilibrium was always reached from both above and below 25°C, and no significant difference were observed. Saturated solutions were analyzed 1 precipitating the silver as AgCl, collecting the prec tate on an asbestos filter followed by drying in an and weighing.	<ul> <li>with AgBrO<sub>3</sub> prepd by pouring a hot solution of 0.6 mol dm<sup>-3</sup> KBrO<sub>3</sub> into an excess of cold 1.3 mol dm<sup>-3</sup> solution of AgNO<sub>3</sub>. The precipitate was collected on a hardened filter, washed, and dried at (1) 50-60°C or (2) at 105°C. A preparation as in (1) was used to prepare a third solid sample by recrystallizing from boiling water followed by drying at 105°C. Source and purity of potassium nitrate not specified.</li> <li>ESTIMATED ERROR: Soly: see table and footnote a above. Temp: precision ± 0.05 K.</li> </ul>				
	REFERENCES:				

COMPONENTS: (1) Silver bromate; AgBrO <sub>s</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS: Vosburgh, W.C.; Cogswell, S.A.
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	J. Am. Chem. Soc. <u>1943</u> , 65, 2412-3.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Concentration of potassium nitrate T/K = 298.15	PREPARED BY: H. Miyamoto

The solubility, S, of AgBrO<sub>3</sub> in KNO<sub>3</sub> solutions is given in the table below.

KNO <sub>3</sub> concn	103S	105K0 <b>,</b> 0
mol kg-1	mol kg-1	
0	8.27	5.61
0.0477	9.49	5.59
0.1002	10.27	5.50
0.401	13.04	5.62

The solubility product of silver bromate was calculated from the following two equations where I is the ionic strength, and  $y_{\pm}$  is the mean molal activity coefficient.

$$K_{s0}^{0} = S^{2}y_{*}^{2}$$

$$-\log y_{\star} = \frac{0.5056\sqrt{I}}{(1+\sqrt{I})} + 0.104\sqrt{I}$$

AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
The procedure was as follows (1). KNO <sub>3</sub> solutions were saturated with AgBrO <sub>3</sub> in Pyrex flasks immersed in a water bath at 25.00°C, and avoiding diffused daylight or artificial light. Samples for analyses were taken after 3-4 h, and again two or more h later to for constancy in concentrations. The aliquots were re- moved with a pipet to which was attached a filter either of Pyrex glass wool or Pyrex fritted glass.	AgBrO <sub>3</sub> prepared by slow precipitation from solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> . Analysis for silver gave 45.70 % (calculated is 45.75 %). Potassium nitrate was of analytical reagent grade.				
Aliquots were weighed and the iodate content deter- mined iodometrically with 0.01 mol dm <sup>-3</sup> thiosulfate solution. Ammonium molybdate was used as a catalyst.	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.05 K.				
	REFERENCES: 1. Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am. Chem. Soc. <u>1941</u> , 63, 2670.				

COMPONENTS:		ORIGINAL	ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Ricci, J.E.;	Ricci, J.E.; Offenbach, J.A.		
(2) Potassium bromate; KBrO <sub>3</sub> ; [7758-01-2]		J. Am. Che	J. Am. Chem. Soc. <u>1951</u> , 73, 1597-9.		
(3) Water; H <sub>2</sub> C	); [7732-18-5]				
VARIABLES: Composition T/K = 298		PREPARED H. Miyamo	PREPARED BY: H. Miyamoto and M. Salomon		
EXPERIMENT	AL DATA:	omposition of satur	rated solutions at 2	50C a,b	
KBrO3	KBrO3	AgBrO <sub>3</sub>	AgBrO3	density	nature of the
mass %	mol %ª	mass %	mol %ª	g cm <sup>-3</sup>	solid phase <sup>b</sup>
0	0	0.193	0.01477*	0.9983	AgBrOs

not given

1.022

1.049

1.050

1.054

1.052

1.053

1.054

1.053

AgBrO<sub>3</sub> + KBrO<sub>3</sub>

KBrO<sub>3</sub>

<sup>a</sup>Mass % solubilities calculated by the compilers. In pure water, the compilers calculate a solubility of 0.008202 mol kg<sup>-1</sup> for AgBrO<sub>3</sub> and 0.4869 mol kg<sup>-1</sup> for NaBrO<sub>3</sub> at 25°C.

0

not given

0

<sup>b</sup>The authors state that the solubility of AgBrO<sub>3</sub> is neglibible, within experimental error, in the presence of potassium bromate.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Isothermal method. Ternary mixtures of known com- position were allowed to equilibrate at $25^{\circ}$ C for two weeks with stirring. The solutions were analyzed for KBrO <sub>3</sub> simply by evaporation to dryness since the solubility of AgBrO <sub>3</sub> in the presence of KBrO <sub>3</sub> is negligible. Method for the determination of AgBrO <sub>3</sub> in pure water not given, but it probably involved titration with KSCN (the Volhard method).	AgBrO <sub>3</sub> was prepared by mixing dilute solutions of bromic acid and Ag <sub>2</sub> CO <sub>3</sub> in the presence of HNO <sub>3</sub> . After some heating and digestion, the solid was washe with water and dried at 110°C. Two batches analyzed for Br gave 99.93 and 99.75 % AgBrO <sub>3</sub> purity. Ag <sub>2</sub> CO <sub>3</sub> prepd by addn of Na <sub>2</sub> CO <sub>3</sub> to an excess of aqueous AgNO <sub>3</sub> solution. Bromic acid sln prepd from dil H <sub>2</sub> SO <sub>4</sub> and solid Ba(BrO <sub>3</sub> ) <sub>2</sub> •H <sub>2</sub> O. KBrO <sub>3</sub> was 99.97 % pure.			
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision probably better than $\pm$ 0.1 K (compilers).			
	REFERENCES:			

3.21

5.70

7.03

7.52

7.57

7.56

7.55

7.52ª

0.8696

COMPONENTS: (1) Silver bromate; AgBrO <sub>5</sub> ; [7783-89-3] (2) Potassium sulfate; K <sub>2</sub> SO <sub>4</sub> ; [7778-80-5] (3) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINA Dalton, J. Am. (	ORIGINAL MEASUREMENTS: Dalton, R. H.; Pomeroy, R.; Weymouth, L. E. J. Am. Chem. Soc. <u>1924</u> , 46, 60-4.		
VARIABLES: Concentration of potassium sulfate T/K = 298.15		PREPAR H. Miya	PREPARED BY: H. Miyamoto		
EXPERIMENTAL DA	ГА:				
number of experiments	K <sub>2</sub> SO <sub>4</sub> concn mol kg <sup>-1</sup>	AgBrO3 soly mmol kg <sup>-1</sup>	av deviation %	density kg dm <sup>-3</sup>	
12	0	8.062	0.14	0.9990	
6	0.025	9.292	0.18	1.0009	
6	0.05	10.015	0.10	1.0028	
3	0.10	11.092	0.05	1.0062	
	AUX	ILIARY INFORMAT	ION	<u></u>	
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
Complete details given in the compilation of the paper by Dalton et al. on the analogous $Na_2SO_4$ -AgBrO <sub>3</sub> -H <sub>2</sub> O system.		the paper K <sub>2</sub> SO <sub>4</sub> of BrO <sub>3</sub> -H <sub>2</sub> O (negative) the comp	$K_2SO_4$ of unknown origin was tested for halide (negative) and used as received. Other details given in the compilation cited on the left.		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Potassium sulfate; K <sub>2</sub> SO <sub>4</sub> ; [7778-80-5] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentration of potassium sulfate T/K = 298 15		ORIGINAL MEASUREMENTS: Lel'chuk, Yu. L. Zh. Neorg. Khim. <u>1958</u> , 3, 2453-7: Russ. J. Inorg. Chem. (Engl. Transl.) <u>1958</u> , 3, 29-35. PREPARED BY: E. M. Woolley			
EXPERIMENTAL DATA:			L		
K <sub>2</sub> SO <sub>4</sub> concn AgBrO <sub>3</sub> soly (S) 10 <sup>5</sup> K mol dm <sup>-3</sup> mmol dm <sup>-3</sup> mol <sup>2</sup>		<sub>s0</sub> = S <sup>2</sup> 2 dm <sup>-6</sup> 105K0 <sub>s0</sub> ys			
0	8.25	6.80		5.50	0.990
0.001	8.45	7.14		5.61	0.887
0.003	8.65	7.48		5.55	0.862
0.010	9.42	8.87		5.72	0.804
0.030	10.61	11.26		5.74	0.714
0.100	13.05	17.03		5.57	0.572
0.300	17.62	31.04		5.50	0.421
<sup>a</sup> K0 <sub>a0</sub> calculated from S <sup>2</sup> y <sup>2</sup> where y is the activity coefficient calculated from an unspecified form of the Debye-Hückel equation using an ion size parameter of 0.910 x 10 <sup>-10</sup> m.					cified form of the
	AUXI	LIARY IN	FORMATI	ON	
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
Duplicate samples analyzed for both silver and for bromate: i.e. each solubility value in the above table is the average of four analyses as described in the compilation of Lel'chuk's study of the analogous		$K_2SO_4$ prepd from equivalent amounts of $K_2CO_3$ and $H_2SO_2$ . All remaining information given in the compilation cited on the left.			
Na <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.			ł		

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COMPONENTS: (1) Silver bromate; Ag (2) Potassium perchlor (3) Water; H <sub>2</sub> O; [7732-	ORIGINAL MEASUREMENTS: Dalton, R. H.; Pomeroy, R.; Weymouth, L. E. J. Am. Chem. Soc. <u>1924</u> , 46, 60-4.					
VARIABLES: Concentration of potassium perchlorate T/K = 298.15			PREPARED BY: H. Miyamoto			
EXPERIMENTAL DAT	ГА:					
number of experiments	KClO <sub>4</sub> concn mol kg <sup>-1</sup>	AgBr mmc	O <sub>3</sub> soly ol kg <sup>-1</sup>	av deviation %	density kg dm- <sup>3</sup>	
12 3 2	0 0.025 0.05	8.06 8.7 9.10	52 16 20	0.14 0.03 0.03	0.9990 1.0010 1.0033	
5	0.10	9.70	06	0.02	1.0074	
	AUXI	LIARY IN	FORMAT	ION		
METHOD/APPARATUS/PROCEDURE: Complete details given in the compilation of the paper by Dalton et al. on the Na <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.			SOURCE AND PURITY OF MATERIALS: C.p. grade KClO <sub>4</sub> was recrystallized and dried at 100-110°C for several hours. Other details given in the compilation cited on the left.			

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Magnesium nitrate; Mg(NO <sub>3</sub> ) <sub>2</sub> ; [10377-60-3]			ORIGINAL MEASUREMENTS: Tananaev, I.V.; Lel'chuk, Yu. L.; Petrovitskaya, B.K.			
			(3) Water; H <sub>2</sub> O; [7732-	18-5]	C	hem. USSR (Engl. Transl
VARIABLES: Concentration of magnesium nitrate			PREPARED BY:			
T/K = 298.2		E	. M. Woolley			
EXPERIMENTAL DAT	ГА:					
Mg(NO <sub>3</sub> ) <sub>2</sub> concn	AgBrO <sub>3</sub> soly (S)	10 <sup>5</sup> K <sub>s0</sub> =	s S <sup>2</sup>			
mol dm-3	mmol dm-s	mol² dr	n-6 105K0 <sub>s0</sub>	У±ь		
0	8.26	6.83	5.50	0.990		
0.001	8.56	7.33	5.82	0.981		
0.003	8.72	7.60	5.75	0.870		
0.01	9.28	8.61	5.78	0.820		
0.03	9.81	9.62	5.36	0.746		
0.1	11.1	12.3	4.95	0.634		
0.3	12.7	16.1	4,56	0.532		
1.0	17.3	30.0	5.5	0.428		
*The average soly in p	ure water was also giver	n as 0.1948 g	100 cm <sup>3</sup> .			
<sup>b</sup> K <sup>0</sup> <sub>s0</sub> calculated from	S <sup>2</sup> y <sub>±</sub> <sup>2</sup> where	-				
	og y <sub>±</sub> = -0.505I1/2/(1 +	0.33 x 2.4I <sup>1/</sup>	<sup>2</sup> ) and $I = 3[Mg(NO_3)_2]$	+ S		
	AUXI	LIARY INFO	PRMATION			
METHOD/APPARATU	JS/PROCEDURE:	so	OURCE AND PURITY OF	F MATERIALS:		
Each solubility value in	n the above table is the	average M	g(NO <sub>3</sub> ) <sub>2</sub> recrystallized twi	ce. All remaining informa-		
of four analyses (from	two separate experimen	ts) as tic	on given in the compilatio	n cited on the left.		

Each solubility value in the above table is the average of four analyses (from two separate experiments) as described in the compilation of Lel'chuk's study of the Na<sub>2</sub>SO<sub>4</sub>-AgBrO<sub>3</sub>-H<sub>2</sub>O system.

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COMPONENTS:	ORIGINAL MEASUREMENTS:				
(1) Silver bromate; A;	(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]			R. H.; Pomeroy, R.;	Weymouth, L. E.
<ul> <li>(2) Magnesium nitrate; Mg(NO<sub>3</sub>)<sub>2</sub>; [10377-60-3]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> <li>VARIABLES: Concentration of magnesium nitrate T(K = 208.15</li> </ul>			J. Am. Chem. Soc. <u>1924</u> , 46, 60-4. PREPARED BY:		
EXPERIMENTAL DA	TA:				
number of	Mg(NO <sub>3</sub> ) <sub>2</sub> concn	AgBr	O3 soly	av deviation	density
experiments	mol kg-1	mmo	l kg-1	%	kg dm <sup>-3</sup>
12	0	8.06	2	0.14	0.9990
6	0.025	8.93	5	0.25	1.0003
3	0.05	9.41	4	0.05	1.0018
8	0.10	10.09	90	0.12	1.0046
	AUXII	LIARY IN	FORMAT	ION	
METHOD/APPARAT	US/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Complete details give by Dalton et al. on th	n in the compilation of th e Na <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O s	e paper system.	$Mg(NO_3)_2$ prepd by adding HNO <sub>3</sub> to MgCO <sub>3</sub> sln to neutralization. Mg analyzed as $Mg_2P_2O_7$ . Other details given in the compilation cited on the left.		

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; Ag	BrO <sub>3</sub> ; [7783-89-3]		Dalton, R. H.; Pomeroy, R.; Weymouth, L. E.		
(2) Magnesium sulfate; MgSO4; [7487-88-9] (3) Water; H <sub>2</sub> O; [7732-18-5]			J. Am. Chem. Soc. <u>1924</u> , 46, 60-4.		
VARIABLES:			PREPAR	ED BY:	
Concentration of magnesium sulfate $T/K = 298.15$			H. Miyamoto		
EXPERIMENTAL DA	TA:				
number of	MgSO₄ concn	AgBr	O <sub>3</sub> soly	av deviation %	
experiments	mor ng -				
12	0	8.06	52	0.14	
2	0.0200	8.92	2	0.12	
3	0.0510	9.67	1	0.12	
4	0.1000	10.3		0.13	
4	0.1988	11.3	8	0.13	
	AUXI	ILIARY IN	FORMAT	ION	
METHOD/APPARAT	US/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Complete details given in the compilation of the paper by Dalton et al. on the KNO <sub>3</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.			Source an details giv	ad purity of MgSO <sub>4</sub> not specified. Reven in the compilation cited on the le	maining ft.

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COMPONENTS.			OBICINA	I MEACHDEMENT	т <b>с</b> .
COMPONENTS:			URIGINA	L MEASUREMENT	Di be I to Detucuitations D V
(1) Silver bromate; AgBrO <sub>3</sub> ; [//83-89-5]			Tananaev	, I.V.; Lercnuk, I	u. L.; Petrovitskaya, B.K.
(2) Calcium nitrate; Ca	$a(NO_3)_2; [10124-37-5]$		Zh. Obsh	ich. Khim. <u>1949,</u> 19	7, 1207-15: J. Gen.
(3) Water; $H_2O$ ; [7732-	-18-5]		Chem. U.	SSR (Engl. Transl.)	<u>1949,</u> <b>19,</b> 1201-9.
VARIABLES:			PREPARE	D BY:	
Concentration of calci	um nitrate				
T/K = 298.2			E. M. Wo	olley and H. Miyan	noto
EXPERIMENTAL DATA:					
Ca(NO <sub>3</sub> ) <sub>2</sub> concn	AgBrO <sub>3</sub> soly (S)	105K	$_{0} = S^{2}$		
mol dm-3	mmol dm-3	mol <sup>2</sup>	dm-6	10 <sup>5</sup> K <sup>0</sup> ,0	У±ь
0	8.26ª	6.	83	5.50	0.990
0.001	7.91	6.	26	4.99	0.893
0.003	8.07	6.	51	4.93	0.870
0.01	9.15	8.	36	5.58	0.818
0.03	9.88	9.	74	5.35	0.741
0.1	11.1	12.	3	4.88	0.630
0.3	13.3	17.	7	4.77	0.519
1.0	18.1	32.	8	5.50	0.410
The average soly in p	oure water was also given	as 0.1948	3 g 100 cm <sup>4</sup>	3.	
<sup>b</sup> K <sup>0</sup> <sub>s0</sub> calculated from	S <sup>2</sup> y <sub>±</sub> <sup>2</sup> where				
	$\log y_{\pm} = -0.505 I^{1/2} / (1 + 1)^{1/2}$	0.33 x 2.1	9I1/2) and	$I = 3[Ca(NO_3)_2] +$	S
	AUXII	LIARY IN	FORMATI	ON	
METHOD/APPARAT	US/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Each solubility value i	n the above table is the	average	Source and	purity of Ca(NO <sub>3</sub> )	2 not given. All
of four analyses (from	two separate experiment	ts) as	remaining information given in the compilation cited		
described in the comp	ilation of Lel'chuk's stud	y of the	on the left	t.	:
Na2SO4-AgBrO3-H2O	system.	-			

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]			nanaev, I.V.; Lel'chuk, Y	(u. L.; Petrovitskaya, B.K.	
(2) Strontium nitrate; Sr(NO <sub>3</sub> ) <sub>2</sub> ; [10042-76-9]			. Obshch. Khim. <u>1949</u> , 19	9, 1207-15: J. Gen.	
(3) Water; H <sub>2</sub> O; [7732-	(3) Water; H <sub>2</sub> O; [7732-18-5]			) <u>1949</u> , <b>19</b> , 1201-9.	
VARIABLES:		PRI	EPARED BY:		
Concentration of stror	tium nitrate	1	N # 117 - 11 1 77 N #		
1/K = 298.2		<u>F.</u>	M. woolley and H. Miyan	moto	
EXPERIMENTAL DA	TA:				
$Sr(NO_3)_2$ concn	AgBrO <sub>3</sub> soly (S)	$10^{5}K_{s0} = 3$	52		
mol dm-3	mmol dm-3	mol² dm·	6 105K0 <sub>a0</sub>	У±а	
0	8.26	6.83	5.50	0.990	
0.001	8.40	7.06	5.60	0.890	
0.003	8.59	7.38	5.55	0.867	
0.01	8.96	8.03	5.34	0.815	
0.03	10.0	10.0	5.41	0.736	
0.1	12.2	14.9	5.45	0.605	
0.3	14.3	20.4	5.10	0.500	
1.0	19.4	37.6	5.50	0.382	
*K0,0 calculated from	S <sup>2</sup> y <sub>±</sub> <sup>2</sup> where				
	$\log y_{\pm} = -0.505 I^{1/2} / (1 + 1)^{1/2} $	0.33 x 1.92I1/2	2) and $I = 3[Sr(NO_3)_2] +$	S	
	AUXI	LIARY INFOR	RMATION		
METHOD/APPARAT	US/PROCEDURE:	sou	JRCE AND PURITY OF	MATERIALS:	
Each solubility value i	in the above table is the	average Sou	rce and purity of Sr(NO <sub>3</sub> )	2 not given. All remain-	
of four analyses (from	two separate experimen	ts) as ing	ing information given in the compilation cited on the		
described in the comp	ilation of Lel'chuk's stud	ly of the left.			
Na2SO4-AgBrO3-H2O	system.				

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Barium nitrate; Ba(NO <sub>3</sub> ) <sub>2</sub> ; [10022-31-8] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentration of barium nitrate T/K = 298.15			ORIGINAL MEASUREMENTS: Dalton, R. H.; Pomeroy, R.; Weymouth, L. E. J. Am. Chem. Soc. <u>1924</u> , 46, 60-4. PREPARED BY: H. Miyamoto			
number of experiments	Ba(NO <sub>3</sub> ) <sub>2</sub> concn mol kg <sup>-1</sup>	AgBrO <sub>3</sub> soly mmol kg <sup>-1</sup>	av deviation %	density kg dm <sup>-3</sup>		
12	0	8.062	0.14	0.9990		
2	0.025	9.088	0.04	1.0018		
2	0.05	9.655	0.00	1.0046		
4	0.10	10.373	0.18	1.0098		
	AUXI	LIARY INFORMA	TION			
METHOD/APPARAT Complete details giver by Dalton et al. on the	ne paper ystem. SOURCI Ba(NO <sub>3</sub> ) const ma Other de	SOURCE AND PURITY OF MATERIALS: Ba(NO <sub>3</sub> ) <sub>2</sub> of unknown source dried to 100-110 <sup>o</sup> C to const mass. AgNO <sub>3</sub> test for halides was negative. Other details given in the compilation cited on the left.				

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Barium nitrate; Ba(NO <sub>3</sub> ) <sub>2</sub> ; [10022-31-8]			ORIGINAL MEASUREMENTS: Tananaev, I.V.; Lel'chuk, Yu. L.; Petrovitskaya, B.K.			
			(3) Water; H <sub>2</sub> O; [7732-	(3) Water; H <sub>2</sub> O; [7732-18-5]		
VARIABLES: Concentration of barium nitrate T/K = 298.2			PREPARED BY: E. M. Woolley			
EXPERIMENTAL DA	TA:					
$Ba(NO_3)_2$ concn	AgBrO <sub>3</sub> soly (S)	105K	$_{0} = S^{2}$			
mol dm-3	mmol dm-3	mol <sup>2</sup>	dm-6	105K0,00	У±ь	
0	8.26ª	6.83		5.50	0.990	
0.001	8.24	6.	78	5.38	0.891	
0.003	8.39	7.	04	5.30	0.868	
0.01	8.94	8.	00	5.31	0.816	
0.03	9.91	9.	82	5.31	0.736	
0.1	12.2°	14	.8d	5.67	0.619	
0.3	14.9	22.	.2d	5.50	0.498	
The average soly in r	oure water was also giver	n as 0.194	8 g 100 cm <sup>s</sup>	3,		
<sup>b</sup> K <sup>0</sup> <sub>s0</sub> calculated from	S <sup>2</sup> y <sub>±</sub> <sup>2</sup> where					
	$\log y_{\pm} = -0.505 I^{1/2} / (1 + 1)^{1/2} $	0.33 x 1.9	91 <b>I</b> <sup>1/2</sup> ) and	$I = 3[Ba(NO_3)_2] +$	S	
•There is an apparent	misprint for this solubili	ity in the	original arti	icle.		
dThere are misprints of	of these values near the t	peginning	of the artic	le which, near the	end, were given as thes	e
correct values.						
	AUXI	LIARY IN	FORMATI	ON		
METHOD/APPARAT	US/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:			
Each solubility value i	in the above table is the	average	Source and	l purity of Ba(NO <sub>3</sub> )	2 not given. All remai	n-
of four analyses (from	two separate experimen	ts) as	ing information given in the compilation cited on the			

described in the compilation of Lel'chuk's study of the left.

Na<sub>2</sub>SO<sub>4</sub>-AgBrO<sub>3</sub>-H<sub>2</sub>O system.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Noyes, A. A.
(2) Silver nitrate: AgNO.: 17761-88-81	• •
(2) Water: $H \cap (7722)$ 19 51	7 Blue Cham 1900 6 241 67
(3) water, H <sub>2</sub> O, [7752-18-5]	Z. Phys. Chem. <u>1890</u> , 6, 241-67.
VARIABLES:	PREPARED BY:
Concentration of silver nitrate	
T/K = 297.7	E. M. Woolley and H. Miyamoto
EXPERIMENTAL DATA:	
AgNO <sub>2</sub> concn	AgBrO <sub>2</sub> solv
mmol dm-3	mmol dm-8
minor din -	
0	8 10
0.50	5.10
8.50	5.10
34.6	2.16
AUXILIARY I	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Excess AgBrO. in an AgNO. slns thermostated at	
24.50C with frequent exitation for several days	Nothing specified
24.5°C with frequent agration for several days.	Nothing specified.
Solubility determined by lodometric titrh.	······································
	ESTIMATED ERROR:
	Nothing specified
	Inoming sheetilen.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate: AgBrO <sub>3</sub> : [7783-89-3]		Lel'chuk, Yu. L.			
(2) Cadmium nitrate: Cd(NO <sub>2</sub> ) <sub>2</sub> : [10325-94-7]		Zh. Obshch. Khim.	1955, 25, 1273-7: J. Gen. Chem.		
(3) Water; H <sub>2</sub> O;	[7732-18-5]		USSR (Engl. Transl.	1955, 25, 1219-22.	
VADIARIES.			DEPADED BV		
Concentration of	of cadmium nitrate		FREFARED DI:		
T/K = 298			E. M. Woolley and H	. Miyamoto	
EXPERIMENT	AL DATA:				
concn of	soly, S, of				
$Cd(NO_3)_2$	AgBrO <sub>3</sub>	$10^{5}K_{s0} = S^{2}$			
mol dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>	105K°*0	У± <sup>в</sup>	
0	8.25	6.80	5.50	0.900	
0.001	8.13	6.61	5.26	0.892	
0.003	8.42	7.09	5.37	0.870	
0.010	8.75	7.66	5.16	0.820	
0.030	9.10	8.28	4.60	0.746	
0.100	10.4	10.8	4.38	0.637	
0.300	13.2	17.4	4.89	0.530	
1.000	17.4	30.3	5.50	0.426	
			And Dates Thetel		
•Mean molar ac	285 - 10-10 m Th	$\frac{1}{\pm}$ calculated from ex	tended Debye-Huckel e	equation using an ion size	
parameter of 2.	385 X 10-10 m. 1 m	ermodynamic solubili	ty product K° <sub>80</sub> calculat	$\frac{1}{2} \sum_{n=1}^{\infty} \sum_{i=1}^{\infty} \sum_{j=1}^{\infty} \sum_{i=1}^$	
		AUXILIARY	INFORMATION		
METHOD/APP	ARATUS/PROCED	URE:	SOURCE AND PURI	ГҮ OF MATERIALS:	
Ag detd gravim	etrically as AgCl.	Other details identi-	C.p. grade Cd(NO <sub>3</sub> ) <sub>2</sub> t	used (nothing else specified). For	
cal to those give	en in the compilation	on of the paper by	details on prepn of A	gBrO <sub>3</sub> , see the compilation cited	
Lel'chuk et al.	for the AgBrO <sub>3</sub> -Na	NO3-H2O system.	on the left.		
			ESTIMATED ERROR		
			Soly: nothing specified	1.	
			Temp: precision + 1 K		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Cadmium sulfate; CdSO <sub>4</sub> ; [10124-36-4] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentration of cadmium sulfate			ORIGINAL MEASUREMENTS: Dalton, R. H.; Pomeroy, R.; Weymouth, L. E. J. Am. Chem. Soc. <u>1924</u> , 46, 60-4. PREPARED BY:		
T/K = 298.15			H. Miyaı	moto	
EXPERIMENTAL DA	ГA:				
number of experiments 12 2 1	CdSO <sub>4</sub> concn mol kg <sup>-1</sup> 0 0.10 0.50	AgBr mmo 8.06 10.4( 13.34	O3 soly 1 kg-1 2 35 19	av deviation % 0.14 0.05 	density kg dm- <sup>3</sup> 0.9990 1.0017 . 1.0492
	AUXI	ILIARY IN	FORMAT	ION	
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
Complete details given by Dalton et al. on the system.	in the compilation of t analogous Na <sub>2</sub> SO <sub>4</sub> -AgE	he paper BrO <sub>3</sub> -H <sub>2</sub> O	C.p. grade $3CdSO_4 \cdot 8H_2O$ crystals treated with a little $H_2SO_4$ and ignited to $350 - 400^{\circ}C$ . Other details given in the compilation cited on the left.		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Cadmium sulfate; CdSO <sub>4</sub> ; [10124-36-4] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentration of cadmium sulfate			ORIGINAL MEASUREMENTS: Lel'chuk, Yu. L.; Skripova, L.L.; Chashchina, O.V. Zh. Neorg. Khim. <u>1961</u> , 6, 474-75: Russ. J. Inorg. Chem. (Engl. Transl.) <u>1961</u> , 6, 239-41. PREPARED BY:		
T/K = 298.15		E. M. Wo	olley		
EXPERIMENTAL DA	TA:				
CdSO₄ concn mol dm <sup>-3</sup>	AgBrO <sub>3</sub> soly (S) mmol dm <sup>-3</sup>	$10^{5}K_{s0} = S^{2}$ mol <sup>2</sup> dm <sup>-6</sup>	105K0.80	ya	
0.001	8.17	6.67	5.28	0.890	
0.003	8.43	7.11	5.30	0.863	
0.010	8.85	7.83	5.09	0.806	
0.030	9.74	9.49	5.03	0.728	
0.100	10.8	11.70	4.52	0.621	
0.300	13.3	17.70	4.83	0.523	
1.000	17.2	29.69	5.50	0.431	
•K <sup>0</sup> <sub>s0</sub> calculated from an ion size parameter	$S^2y^2$ where y is the active of 2.608 x 10 <sup>-10</sup> m.	ity coefficient calcul	ated from the Deb	ye-Hückel equation using	3
	AUXI	LIARY INFORMATI	ON		
METHOD/APPARAT	US/PROCEDURE:	SOURCE A	AND PURITY OF	MATERIALS:	

Duplicate samples analyzed for both silver and for bromate: i.e. each solubility value in the above table is the average of four analyses as described in the compilation of Lel'chuk's study of the analogous Na<sub>2</sub>SO<sub>4</sub>-AgBrO<sub>3</sub>-H<sub>2</sub>O system. CdSO<sub>4</sub> slns prepd by diluting 1 mol dm-<sup>3</sup> CdSO<sub>2</sub> slns with double dist water. All remaining information given in the compilation cited on the left.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]			Lel'chuk, Yu. L.		
(2) Zinc nitrate: Zn(NO <sub>3</sub> ) <sub>2</sub> ; [7792-88-6]			Zh. Obsh	ch. Khim. <u>1955</u> , 25	5, 1273-7: J. Gen.
(3) Water; H <sub>2</sub> O; [7732-18-5]			Chem. US	SSR (Engl. Transl.)	<u>1955</u> , <b>25</b> , 1219-22.
VARIABLES:			PREPARE	D BY:	
Concentration of zinc 1	nitrate				
1/K = 298			E. M. WO	olley and H. Miyan	noto
EXPERIMENTAL DAT	<b>A:</b>				
$Zn(NO_3)_2$ concn	AgBrO <sub>3</sub> soly (S)	105K	∎0 = S <sup>2</sup>		
mol dm-3	mmol dm-3	mol <sup>2</sup>	dm-6	10 <sup>5</sup> K0,0	У± <sup>а</sup>
0	8.25	6.	80	5.50	0.990
0.001	8.43	7.	11	5.63	0.890
0.003	8.75	7.	65	5.75	0.867
0.001	9.12	8.	32	5.52	0.815
0.030	10.2	10.	.4	5.64	0.737
0.100	11.6	13.	.4	5.13	0.619
0.300	14.7	21.	.6	5.44	0.502
1.000	19.3	37.	.2	5.50	0.384
<sup>a</sup> K0 <sub>s0</sub> calculated from S <sup>2</sup> y <sup>2</sup> where activity coefficients y			calculated i	from extended Deb	ye-Hückel equation using
an ion size parameter of 1.94 x 10 <sup>-10</sup> m.					
	AUXI	LIARY IN	FORMATI	ON	
METHOD/APPARATU	S/PROCEDURE:		SOURCE	AND PURITY OF	MATERIALS:
Ag content of satd slns	detd gravimetrically as	AgCl.	Source and purity of Zn(NO <sub>3</sub> ) <sub>2</sub> •6H <sub>2</sub> O not given. All		
Other details same as in	n the compilation of Le	l'chuk's	remaining information given in the compilation cited		
study of the Li <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.			on the left	-	
			ESTIMATED ERKOR:		
			Soly: nothing specified.		
			1 emp: pre	CISION ± I K.	

COMPONENTS: (1) Silver bromate; AgBrO <sub>5</sub> ; [7783-89-3] (2) Zinc sulfate; ZnSO <sub>4</sub> ; [7446-20-0] (3) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Lel'chuk, Yu. L.; Skripova, L.L.; Chashchina, O.V. Zh. Neorg. Khim. <u>1961</u> , 6, 474-5: Russ. J. Inorg. Chem. (Engl. Transl.) <u>1961</u> , 6, 239-41.			
VARIABLES: Concentration of zinc sulfate T/K = 298.2		PREPARED BY: E. M. Woolley			
EXPERIMENTAL DA	TA:				
ZnSO <sub>4</sub> concn	AgBrO <sub>3</sub> soly (S)	105K	$_{0} = S^{2}$		
mol dm-3	mmol dm-3	mol <sup>2</sup>	dm-6	105K0 <sup>90</sup>	У± <sup>а</sup>
0.001	8.22	6.	76	5.34	0.889
0.003	8.51	7.	24	5.37	0.862
0.01	8.88	7.	88	5.12	0.806
0.03	9.88	9.	76	5.14	0.726
0.1	11.3	12.	80	4.89	0.618
0.3	14.0	19.	60	5.23	0.517
1.0	17.5	30.	62	5.50	0.424
${}^{*}K_{s0}^{0}$ calculated from S <sup>2</sup> y <sup>2</sup> where activity coefficients y an ion size parameter of 2 593 x 10-10 m			calculated	from extended Deb	oye-Hückel equation using
AUXILIARY IN			FORMAT	ION	<u> </u>
METHOD/APPARATUS/PROCEDURE:			SOURCE	AND PURITY OF	MATERIALS:
Each solubility value in the above table is the average			ZnSO <sub>4</sub> sl	ns prepd by diluting	a 1 mol dm-3 sln of
of four analyses (from two separate experiments) as			ZnSO4•7H	120 with doubly dis	t water. All remaining
described in the compilation of Lel'chuk's study of the			informati	ion given in the com	pilation cited on the left.
Li <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.					

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Cerium nitrate; Ce(NO <sub>3</sub> ) <sub>3</sub> ; [10108-73-3] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Concentration of cerium nitrate T/K = 298.15 /			ORIGINAL MEASUREMENTS: Dalton, R. H.; Pomeroy, R.; Weymouth, L. E. J. Am. Chem. Soc. <u>1924</u> , 46, 60-4. PREPARED BY:		
			H. Miyaı	moto	
EXPERIMENTAL DA	.TA:				
number of experiments	Ce(NO <sub>3</sub> ) <sub>3</sub> concn mol kg <sup>-1</sup>	AgBr( mmo	D <sub>3</sub> soly l kg-1	av deviation %	density kg dm <sup>-3</sup>
12	0	8.06	2	0.14	0.9990
2	0.0125	8.88	8	0.14	1.0002
2	0.025	9.33	6	0.22	1.0014
	AUXII	LIARY IN	FORMAT	ION	
METHOD/APPARATUS/PROCEDURE:			SOURCE	AND PURITY OF M	IATERIALS:
Complete experimental details given in the compilation of the paper by these authors on the system Na <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O.		A "domes on materi	tic" Ce(NO <sub>3</sub> ) <sub>3</sub> hydrate als given in the comp	e was used. Other details bilation cited on the left.	

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Longi, A.	
(2) Nitric acid; HNO <sub>3</sub> ; [7697-37-2]		
(3) Water; H <sub>2</sub> O; [7732-18-5]	Gazz. Chim. Ital. <u>1883</u> , 13, 87-9.	
VARIABLES:	PREPARED BY:	
T/K = 298	B. Scrosati	
T/K = 298	B. Scrosati	

The solubility of  $AgBrO_3$  in a solution of 35 mass % HNO<sub>3</sub> (specific gravity 1.21) is one gram of  $AgBrO_3$  in 262.83 cm<sup>3</sup> of solution. This is equivalent to 0.0161 mol dm<sup>-3</sup> (compiler).

The solubility was given as one gram of AgBrO<sub>3</sub> in 320.36 g solvent. This is equivalent to 0.0132 mol per kg of <u>solvent</u>: i.e. per kg of 35 mass % HNO<sub>3</sub> (compiler).

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Nothing specified, but the solubility was probably detd gravimetrically after evaporation to dryness.	Nothing specified.			

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Sulfuric acid; H <sub>2</sub> SO <sub>4</sub> ; [7664-93-9] (3) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Lel'chuk, Yu. L. Zh. Neorg. Khim. <u>1958</u> , 3, 2453-7: Russ. J. Inorg. Chem. (Engl. Transl.) <u>1958</u> , 3, 29-35.			
VARIABLES: Concentration of sulfuric acid T/K = 298.2			PREPARED BY: E. M. Woolley		
AgBrO <sub>3</sub> soly (S) mmol dm <sup>-3</sup>	$10^{5}K_{s0} = S^{2}$ mol <sup>2</sup> dm <sup>-6</sup>	105K0 <b>,</b> 0	ya		
8.25	6.80	5.50	0.990		
8.34	6.955	5.67	0.903		
8.44	7.12	5.57	0.885		
8.585	7.37	5.30	0.848		
9.073	8.23	5.23	0.797		
9.806	9.62	5.17	0.733		
10.75	11.56	5.33	0.678		
11.76	13.83	5.50	0.631		
	AgBrOs soly (S) mmol dm <sup>-3</sup> 8.25 8.34 8.44 8.585 9.073 9.806 10.75	I       Chem. (E         cid       PREPARE         E. M. Wo         AgBrO <sub>3</sub> soly (S) $10^5K_{*0} = S^2$ mmol dm-3       mol <sup>2</sup> dm-6         8.25       6.80         8.34       6.955         8.44       7.12         8.585       7.37         9.073       8.23         9.806       9.62         10.75       11.56         11.76       12.82	I       Chem. (Engl. Transl.) 1958,         cid       PREPARED BY:         E. M. Woolley         AgBrOs soly (S) $10^5 K_{s0} = S^2$ mmol dm <sup>-3</sup> mol <sup>2</sup> dm <sup>-6</sup> $10^5 K_{s0}^0$ 8.25       6.80       5.50         8.34       6.955       5.67         8.44       7.12       5.57         8.585       7.37       5.30         9.073       8.23       5.23         9.806       9.62       5.17         10.75       11.56       5.33		

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Duplicate samples analyzed for both silver and for	Technical grade H <sub>2</sub> SO <sub>4</sub> dist from dichromate. A 1 mol
bromate: i.e. each solubility value in the above table is	dm-3 acid sln used in dilutions with doubly dist water.
the average of four analyses as described in the	All remaining information given in the compilation
compilation of Lel'chuk's study of the analogous	cited on the left.
Li <sub>2</sub> SO <sub>4</sub> -AgBrO <sub>3</sub> -H <sub>2</sub> O system.	

ORIGINAL MEASUREMENTS:		
Ramette, R. W.; Spencer, J. B. L. Bhys. Chem. 1963, 67, 944, 6		
PREPARED BY: H. Miyamoto		
AgBrO <sub>3</sub> soly		
mmol kg <sup>-1</sup>		
8.03		
8.54		
8.95		
9.37		
9.61		
9.79		
NFORMATION		
SOURCE AND PURITY OF MATERIALS:		
See compilation cited on the left for complete details.		
ESTIMATED ERROR:		
-		

Nothing specified.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Acetic acid; C <sub>2</sub> H <sub>4</sub> O <sub>2</sub> ; [64-19-7] (3) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Hill, A. E. J. Am. Chem. Soc. <u>1917</u> , 39, 218-31.			
		VARIABLES:			PREP
T/K = 298.15			н. м	iyamoto	
EXPERIMENTAL DATA:	·····	·	1	<u> </u>	
acetic acid concn mol dm- <sup>3</sup>	AgBrO <sub>3</sub> soly g/50.13 cm <sup>-3</sup>	met	thoda	av solubility g dm <sup>-3</sup>	av solubility. mmol dm <sup>-3</sup>
0.0	0.0979	U			
	0.0977	S			
	0.0977	U			0.4440
	0.0976	S		1.9493	8.2668
0.0498	0.0975	U			
	0.0973	S		1.9429	8.2398
0 0007	0 0073	TT			
0.0777	0.0970	S		1.9379	8.2187
0.1005	0.00/05				
0.1995	0.09625	U S		1 9206	8 1451
	0.0905	5		1.9200	0.1451
0.4988	0.09346	U			
	0.0934	S		1.863	7.9041
0.9975	0.0904	U			
	0.0902	S		1.8013	7.6392
1 8721	0.0804	IJ			
	0.0818	s		1.6178	6.8608
		_			
• U: equilibrium approache	d from undersaturation	n. S:e	quilibr	ium approached from	m supersaturation.
	AUXILIA	ARY IN	FORM	ATION	
METHOD/APPARATUS/PROCEDURE: AgBrO <sub>3</sub> , acetic acid and water were placed in stoppered bottles or Florence flasks. In some experi- ments, the bottles were rotated in a thermostat held at		SOURCE AND PURITY OF MATERIALS: AgBrO <sub>3</sub> prepared by mixing 1 mol dm <sup>-3</sup> solutions of KBrO <sub>3</sub> and AgNO <sub>3</sub> . The precipitate was washed and recrystallized from boiling water. Ag content analyzed			
25.00°C, and in other experiments glass paddles were used to stir the mixtures in the flasks for 3 days. Equilibrium was reached from both undersaturation		as Ag C.p. gi standa	Cl: found 44.97 and rade acetic acid was rd KOH solution.	45.00 % (calcd 45.75 %). analyzed by titration with	
and from supersaturation. The AgBrO <sub>3</sub> content in the saturated solutions was determined by evaporation of pipetted aliquots of 50.13 cm <sup>-3</sup> , drying at 110°C for 1 hour, and weighing.					
		ESTIN Soly: s Temp:	IATED ERROR: ee reproducibility of precision within ± (	data above. ).02 K.	
			REFERENCES:		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Aqueous ammonia; NH <sub>3</sub> ; [7664-41-7] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Longi, A. Gazz. Chim. Ital. <u>1883</u> , 13, 87-9.	
VARIABLES: T/K = 298	PREPARED BY: B. Scrosati and H. Miyamoto	

# EXPERIMENTAL DATA:

The solubility of AgBrO<sub>3</sub> was determined in a solution of 10 mass % aqueous ammonia (specific gravity = 0.96).

The solubility is one gram of AgBrO<sub>3</sub> in 2.254 cm<sup>-3</sup> of solution. This is equivalent to 1.88 mol dm<sup>-3</sup> (compilers).

The solubility was also reported as one gram of AgBrO<sub>3</sub> in 2.162 g solvent. This is equivalent to 1.96 mol per kg solvent: i.e. per kg of 10 mass % aqueous ammonia solution (compilers).

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
No information was given in the original paper. However, the author probably determined the solubility gravimetrically by evaporating the solvent and weigh- ing the remaining solid.	Nothing specified.			
	ESTIMATED ERROR: Nothing specified.			
	REFERENCES:			

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Lel'chuk, Yu. L.; Surnina, L.V.; Barkhatova, V.I.
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4]	
(3) Potassium bromate; KBrO <sub>3</sub> ; [7758-01-2]	Zh. Obshch. Khim. <u>1955</u> , 25, 1685-93: J. Gen.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Chem. USSR (Engl. Transl.) <u>1955</u> , 25, 1641-6.
VARIABLES:	PREPARED BY:
Concentrations of NaNO <sub>3</sub> and KBrO <sub>3</sub> T/K = 298.2	H. Miyamoto and E. M. Woolley

The solubility of  $AgBrO_3$ , S, in solutions where initial concentrations of  $KBrO_3$  are 0.001, 0.010, and 0.100 mol dm<sup>-3</sup> (three independent experiments were reported) are:

	10	0 <sup>3</sup> S/mol dm- <sup>3</sup> in (	0.001 mol dm- <mark>3</mark> K	CBrO3	•
NaNO <sub>3</sub> concn	expt 1	expt 2	expt 3	mean	104K <sub>s0</sub> a
mol dm-3					mol <sup>2</sup> dm <sup>-6</sup>
0.0	7.25	7.39	7.37	7.32	
0.001	7.50	7.58	7.55	7.54	0.609
0.003	7.92	7.88	7.90	7.90	0.644
0.010	8.29	8.16	8.22	8.22	0.703
0.030	8.88	8.82	8.85	8.85	0.758
0.100	9.68	9.68	9.66	9.67	0.872
0.300	11.2	11.2	11.3	11.2	1.03
1.000	13.5	13.6	13.5	13.5	1.37
	1/	and the form of the second second	) 010 mal dms8 K	· D-O	1.96
NaNO assas		55/moi dm=0 m (		BIU3	
INaiNO <sub>3</sub> conch	expt 1	expt 2	expt 3	mean	10 <sup>4</sup> K <sub>80</sub> <sup>4</sup>
mol dm-s	2.09	4.01	2.07	2.00	mol <sup>2</sup> dm <sup>-6</sup>
0.001	3.98	4.01	3.97	3.99	0.558
0.001	4.75	4.83	4.87	4.82	0.714
0.003	4.94	4.90		4.92	0.734
0.010	5.03	5.00	5.10	5.08	0.700
0.030	5.43	5.54	5.50	5.49	0.850
0.100	0.39	0.35	0.37	0.37	1.04
0.300	7.54	1.54	7.58	7.55	1.32
1.000	11.2	11.1	11.5	11.2	2.37
			C	ontinued	
		AUXILIARY IN	FORMATION		<u> </u>
METHOD/APPARAT	US/PROCEDUR	E:	SOURCE AND	PURITY OF MA	ATERIALS:
AgBrO <sub>3</sub> crystals and the	he aq solutions of	NaNO <sub>3</sub> and	AgBrO <sub>3</sub> prepare	d by mixing sol	utions of AgNO <sub>3</sub> and
KBrO <sub>3</sub> were placed in	400-500 cm <sup>3</sup> pa	rattined brown	KBrO <sub>3</sub> , KBrO <sub>3</sub>	was prepared to	rom KOH and Br <sub>2</sub> .
glass bottles in a thern	nostat at 25.00°C.	The mixtures	NaNO <sub>3</sub> was recr	ystallized twice.	. Doubly distilled water
were vigorously agitated for 8 hours, and the remaining			was used in all e	experiments.	
details of Ag analysis	given in ref. (1)	(probably			
gravimetric analysis as	AgCl, compilers	a). Three exper-			
imental runs were rep	orted (see table a	bove).	ļ		
			ESTIMATED EI	RROR:	
			Soly: the deviation	ons from the me	ean are within ± 1.5 %
			except for	0.1 mol dm-3 K	BrO <sub>3</sub> sins where the
			deviation is	s as high as ± 7.	5 % (compilers).
			Temp: precision	± 0.1 K.	
			<b>REFERENCES:</b>		
			1. Lel'chuk, Yu.	L.; Sasonko, S.	M. Izv. Tomsk.
			Politekhn. In	st. <u>1955</u> , 71, 52.	
	· · · · · · · · · · · · · · · · · · ·				

# Silver Bromate

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Sodium nitrate: NaNO-: [7631-99-4]	Lel'chuk, Yu. L.; Surnina, L.V.; Barkhatova, V.I.
(2) Southin Initiate, Varios, [7051-55-4] (3) Potassium bromate; KBrO <sub>3</sub> ; [7758-01-2]	Zh. Obshch. Khim. 1955, 25, 1685-93: J. Gen.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Chem. USSR (Engl. Transl.) <u>1955</u> , 25, 1641-6.

EXPERIMENTAL DATA: (continued......)

	103S/mol dm-3 in 0.100 mol dm-3 KBrO3				
NaNO <sub>3</sub> concn mol dm- <sup>3</sup>	expt 1	expt 2	expt 3	mean	
0.0	0.98	1.10 ′	1.10	1.06	1.07
0.001	1.09	1.05	1.08	1.07	1.08
0.003	1.12	1.13	1.14	1.13	1.14
0.010	1.18	1,21	1.20	1.20	1.21
0.030	1.24	1.23	1.26	1.24	1.25
0.100	1.33	1.33	1.36	1.34	1.36
0.300	1.52	1.50	1.53	1.52	1.54
1.000	2.62	2,78	2.68	2.69	2.76

• The chemical solubility product is defined by the following equation:

 $K_{s0} = S([KBrO_3] + S)$ 

, <u> </u>			
COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7	783-89-3]	Gilbert, E. C.	
(2) Sodium nitrate: NaNO <sub>3</sub> : [7	631-99-41		
(3) Sodium nicrate: CeHeNeOr	Na: [3324-58-1]	J. Phys. Chem. 1929	33, 1235-46
(d) Water: $H_{-}O$ : [7732-18-5]			, 00, 1200 10.
(4) (1401, 1120, [7752 10-5]			
VARIABLES:		PREPARED BY:	
Concentrations of NaNO <sub>3</sub> and	$NaOC_6H_2(NO_2)_3$		
1/K = 293.15		H. Miyamoto	
		1.	
EXPERIMENTAL DATA:			
	Solubilities reported	for 20.00°C.	
			•
NaNO <sub>3</sub> concn	C <sub>6</sub> H <sub>2</sub> N <sub>3</sub> O <sub>7</sub> Na concn	solubility (S)	$10^5 K_{s0} = S^2$
mol dm-3	mol dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>
0.0	0.100	8.48	7.2
1			
0.100	0.0	8.37	
0 100	0.0	8 44	7 1
0.100	0.0	0.44	7.1
0.050	0.05	0.07	
0.050	0.05	0.37	7.1
0.050	0.05	8.40	7.1
	AUXILIARY IN	FORMATION	
METHOD (ABBADATUS (DDC	CEDUDE.	SOURCE AND BURT	EV OF MATERIALS.
METHOD/APPARATUS/PRU	ICEDURE:	SOURCE AND PURI.	I I OF MATERIALS:
AgBrO <sub>3</sub> crystals and solvent mixtures were rotated until successive analyses gave the same solubility results. The method of analysis of AgBrO <sub>3</sub> in the saturated solutions was not given, but the solubility was probably determined by iodometric titration with standard thiosulfate solution.		AgBrO <sub>3</sub> was made by metathesis from "the purest materials obtainable." Sodium picrate was prepared by mixing equivalent amounts of NaOH and picric acid (Kahlbaum "Zur Analyse") in hot solution. The salt was filtered, washed, recrystallized from water, washed with alcohol, and dried. The final product was the monohydrate. NaNO <sub>3</sub> (Kahlbaum "Zur Analyse") was dried and not treated any further.	
		ESTIMATED ERROR:	
		Soly: precision around $\pm$ 0.04 mmol dm <sup>-3</sup> (compiler). Temp: precision $\pm$ 0.01 K.	
		REFERENCES:	

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Lithium nitrate; LiNO <sub>3</sub> ; [7790-69-4]	ORIGINAL MEASUREMENTS: Ramette, R. W.; Spencer, J. B.
<ul> <li>(3) Perchloric acid; HClO<sub>4</sub>; [7601-90-3]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	J. Phys. Chem. <u>1963</u> , 67, 944-6
VARIABLES: Concentration of LiNO <sub>3</sub> T/K = 298	PREPARED BY: H. Miyamoto

The perchloric acid concentration of all solutions is  $1 \times 10^{-4}$  mol dm<sup>-3</sup>. The acid was added to supress hydrolysis. The authors state that there is a tendency for silver to form hydroxy complexes.

LiNO <sub>3</sub> concn	AgBrO3 soly
mol dm-3	mmol dm-3
0.0	8.03
0.02	8.62
0.05	9.17
0.10	9.73
0.15	10.14
0.20	10.51

Using the Davies equation to estimate activity coefficients (1), the authors computed the thermodynamic solubility product:  $log K_{s0}^{0} = -4.271$ .

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A large excess of $AgBrO_3$ was added to the solutions of LiNO <sub>3</sub> and HClO <sub>4</sub> . Although equilibrium was reached in 2-3 hours, solutions were rotated in an air thermostat at 25°C for at least 24 hours, and then transferred to a water bath for final equilibration and sampling by pressure filtration. The dissolved bromate was determined by duplicate iodometric titration with thiosulfate solution.	AgBrO <sub>3</sub> prepared by slow addition of solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> to distilled water at room temperature. The product was washed, dried, and recrystallized. The purity of this product was deter- mined gravimetrically as AgBr (99.8 %) and by iodometric titration (99.7 %). LiNO <sub>3</sub> and HClO <sub>3</sub> were analytical reagent grade materials.	
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision probably better than ± 0.1 K (compiler).	
	<b>REFERENCES:</b> 1. Davies, C. W. J. Chem. Soc. <u>1938</u> , 2093.	

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9] (3) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3] (4) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Ramette, R. W.; Spencer, J. B. J. Phys. Chem. <u>1963</u> , 67, 944-6
VARIABLES: Concentration of LiClO <sub>4</sub> T/K = 298	PREPARED BY: H. Miyamoto

The perchloric acid concentration of all solutions is  $1 \times 10^{-4}$  mol dm<sup>-3</sup>. The acid was added to supress hydrolysis. The authors state that there is a tendency for silver to form hydroxy complexes.

gBrO <sub>3</sub> soly
mmol dm-3
8.03
8.55
8.97
9.39
9.70
9.94

Using the Davies equation to estimate activity coefficients (1), the authors computed the thermodynamic solubility product:  $log K_{s0}^{0} = -4.271$ .

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A large excess of $AgBrO_3$ was added to the solutions of LiClO <sub>4</sub> and HClO <sub>4</sub> . Although equilibrium was reached in 2-3 hours, solutions were rotated in an air thermostat at 25°C for at least 24 hours, and then transferred to a water bath for final equilibration and sampling by pressure filtration. The dissolved bromate was determined by duplicate iodometric titration with thiosulfate solution.	AgBrO <sub>3</sub> prepared by slow addition of solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> to distilled water at room temperature. The product was washed, dried, and recrystallized. The purity of this product was deter- mined gravimetrically as AgBr (99.8 %) and by iodometric titration (99.7 %). LiClO <sub>4</sub> and HClO <sub>3</sub> were analytical reagent grade materials.	
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision probably better than ± 0.1 K (compiler).	
	REFERENCES:	
	1. Davies, C. W. J. Chem. Soc. <u>1938</u> , 2093.	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Ramette, R. W.; Dratz, E. A.	
(2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]			
(3) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]		J. Phys. Chem. <u>1963</u> , 67, 940-2	
(4) Water; H <sub>2</sub> O; [7732-18-5]			
VARIABLES:		PREPARED BY:	
Concentration of LiClO <sub>4</sub> $T/K = 298.9 = 298.2$ and 308.2		H Miyamoto	
17K = 296.9, 296.2 and 506.2			
EXPERIMENTAL DATA:			
The perchloric acid concentration of all s	olutions is 1 x	10-4 mol dm-3. The acid was added to supress	
hydrolysis.		· · · · · · · · · · · · · · · · · · ·	
I	liClO <sub>4</sub> concn	AgBrO <sub>3</sub> soly	
t/ºC	mol dm-3	mmol dm- <sup>3</sup>	
14.7	0.0	5.56	
	0.025	5.99	
	0.050	6.26	
	0.075	6.43	
	0.100	6.45	
25.0	0.0	8.09	
	0.025	8.73	
	0.050	9.09	
	0.075	9.35	
	0.100	9.52	
35.0	0.0	11.22	
	0.025	12.03	
	0.050	12.48	
	0.075	12.84	
	0.100	13.09	
		an Almond I	
		continued	
AUXILIARY IN		FORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
A large excess of AgBrO <sub>3</sub> was added to t	he solutions of	AgBrOs prepared by slow addition of solutions of	
LiClO <sub>4</sub> and HClO <sub>4</sub> . The solutions were r	otated in	AgNO <sub>3</sub> and KBrO <sub>3</sub> to distilled water at room	
borosilicate glass bottles for two days in a	a thermostat at	temperature. The product was washed, dried, and	
38°C, and were then transferred to a wat	er bath	recrystallized. The purity of this product was deter-	
thermostated at either 35, 25 or 14,7°C.	The bottles	mined gravimetrically as AgBr (99.8 %) and by	
were thermostated at the desired tempera	ture for 3	iodometric titration (99.7 %).	
days with occasional shaking. The satura	ted solutions		
were filtered through fine porous glass h		LiCIO, and HCIO, were analytical reagent grade	
and aliquots were ninetted into titration f	lasks The	materials	
solutions were analyzed for bromate by it	dometric		
titration			
titation.			
		ESTIMATED ERROR:	
		Soly: nothing specified, but see next page.	
		Temp: precision probably better than $\pm 0.1$ K.	
		(compiler).	
		REFERENCES:	

	Gilve			
COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO3;	; [7783-89-3]	Ramette, R. W.; D	Ramette, R. W.; Dratz, E. A.	
(2) Lithium perchlorate; Lie	ClO4; [7791-03-9]			
(3) Perchloric acid; HClO <sub>4</sub> ;	[7601-90-3]	J. Phys. Chem. <u>196</u>	<u>3,</u> 67, 940-2	
(4) Water; H <sub>2</sub> O; [7732-18-5]	]			
EXPERIMENTAL DATA:	(continued)			
The thermodynamic solubili activity coefficient estimate	ity product was evaluated d from the following equa	from K0 <sub>s0</sub> = S <sup>2</sup> y <sup>2</sup> where ations:	S is the solubility and y is the	
log y	$= -AI^{1/2}/(1 + BI^{1/2})$			
where I = S	+ [LiClO4] + [HClO4]			
The results of these calculat	tions and the computed the	ermodynamic functions :	are given below.	
	A	B	-log K <sup>0</sup> s0	
t/ºC	mol <sup>-1/2</sup> dm <sup>-3/2</sup>	mol <sup>-1/2</sup> dm <sup>-3/2</sup>	± 0.006ª	
14.7	0.501	1.71	4.577	
25.0	0.509	1.50	4.265	
35.0	0.519	1.57	3.994	
	ΔG <sup>0</sup>	ΔH0	ΔS <sup>0</sup>	
t/ºC	kcal mol-1	kcal mol-1	cal K <sup>-1</sup> mol <sup>-1</sup>	
25.0	5.83 ± 0.02	$12.7 \pm 0.3$	19.7 ± 1.2	
■All ± quantities given in th	ie above tables are uncerta	inties "estimated for 50	% confidence."	

i.

## Silver Bromate

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Davies, P. B.; Monk, C. B.	
(2) Sodium hydroxide; NaOH; [1310-73-2]		
(3) Acetic acid; C <sub>2</sub> H <sub>4</sub> O <sub>2</sub> ; [64-19-7]	J. Chem. Soc. <u>1951</u> , 2718-23.	
(4) Water; H <sub>2</sub> O; [7732-18-5]		
VARIABLES:	PREPARED BY:	
Concentrations of NaOH and acetic acid		
T/K = 298.15	H. Miyamoto	
EXPERIMENTAL DATA:		
NaOH concn CH <sub>3</sub> COOH c	concn AgBrO <sub>3</sub> soly	
mol dm-3 mol dm-	mmol dm-3	
	0.11	
0.0 0.0	8.11	
0.03180 0.05418	9.28	
0.03975 0.04501	y.34 to 34	
0.07152 0.07760	10.24	
	and the second statement of the second statement of the second statement of the second statement of the second	
AUXILIARY I	NFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Saturating column method used. The bromate concen-	AgBrO, crystals were prepared by addition of dilute	
tration in the saturated solutions was determined by	solutions of A.R. grade KBrO, and AgNO, to a large	
addition of excess KI to about 25 cm <sup>3</sup> aliquots follower	volume of hot water. The product was washed and	
hy addition of about 15 cm <sup>3</sup> of 1 mol dm <sup>-3</sup> H-SO.	dried	
The aliquots were then titrated with standard thicsul-		
fate solution to the storch endpoint	AnalaP acetic acid was used	
rate solution to the staten endpoint.	Analak acene aciu was useu.	
	ESTIMATED ERROR:	
	Soly: nothing specified.	
	Temp: precision $\pm$ 0.03 K.	
	REFERENCES.	

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3] (3) 2-Butanoic acid (vinylacetic acid); C <sub>4</sub> H <sub>6</sub> O <sub>2</sub> ;	ORIGINAL MEASUREMENTS: Keefer, R. M.; Andrews, L. J.; Kepner, R. E. J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.
[625-38-7] (4) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Concentration vinylacetic acid T/K = 298	PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA:	
The solubility of AgBrO <sub>3</sub> was determined at 25°C in below for details on preparation of these solutions).	solutions of constant ionic strength of 1.0 mol dm <sup>-3</sup> (see

C <sub>4</sub> H <sub>6</sub> O <sub>2</sub> concn	AgBrO <sub>3</sub> soly	К1
mol dm-3	10 <sup>2</sup> mol dm- <sup>3</sup>	mol-1 dm <sup>3</sup>
0.467	2.90	16.2
0.234	2.15	16.1
0.117	1.67	16.1
0.0585	1.37	15.8
0	1.01	

The authors reported that  $K_{s0} = 1.029 \times 10^{-4} \mod^2 dm^{-3}$  at a constant ionic strength of 1.0 mol dm<sup>-3</sup>. The authors also reported that  $K_{s0} = 1.00 \times 10^{-4} \mod^2 dm^{-6}$  in a solution of constant ionic strength of 0.10 mol dm<sup>-1</sup> solution using KNO<sub>3</sub> to adjust the ionic strength.

Values of  $K_1$  given in the above table are based on the following equilibrium:

 $Ag^+ + C_4H_6O_2 \Leftrightarrow Ag(C_4H_6O_2)^+$ 

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
HClO <sub>4</sub> was added to aqueous solutions of vinylacetic acid in sufficient quantity to maintain a constant ionic strength of 1.0 mol dm <sup>-3</sup> . These solutions were then added to glass-stoppered Erlenmeyer flasks containing AgBrO <sub>3</sub> crystals. The flasks were agitated for 4 hours at 25°C after which the excess solid was allowed to settle. Aliquots were removed and analyzed for silver by addition of NaBr followed by weighing the precipitated AgBr.	AgBrO <sub>3</sub> crystals were prepared by slowly adding a dilute solution of KBrO <sub>3</sub> to a dilute solution of AgNO <sub>3</sub> . The precipitate was washed, filtered, and placed in water for several days to remove suspended particles of AgBrO <sub>3</sub> . The product was dried at 110°C and analyzed for silver: Ag found = 45.90 %, and Ag calculated = 45.75 %. The preparation of vinylacetic acid was described elsewhere (1). <b>ESTIMATED ERROR:</b> Nothing specified. <b>REFERENCES:</b>	
	<ol> <li>Andrews, L. P.; Kepner, R. E. J. Org. Chem. <u>1949</u>, 71, 2397.</li> </ol>	

110	Silver E	Bromate		
COMPONENTS:		ORIGINAL MEASUREMENTS:		
Silver bromate: AgBrO <sub>3</sub> : 17783-89-31		Monk, C. B.		
(2) Sodium hydroxide: NaOH: [1310-73-2]				
(3) Glycine: C <sub>2</sub> H <sub>2</sub> NO <sub>2</sub> : [56-40-6]		Trans. Faraday Soc. 1951, 47, 292-7.		
(4) Water; $H_2O$ ; [7732-18-5]		That Tanaday Door <u>1201</u> , 47, 252 T		
VARIABLES:		PREPARED BY:		
Concentrations of NaOH and glycine				
1/K. = 298.15		H. Miyamoto and E. M. Woolley		
EXPERIMENTAL DATA:				
NaOH concn	glycine con	cn AgBrO <sub>3</sub> soly		
mol dm-3	mol dm-3	mol dm-3		
0.0	0.0	0 00809\$		
0.00691	0.01569	0.01112		
0.00081	0.01508	0.01112		
0.01634	0.02758	0.01518		
0.01777	0.04037	0.01595		
0.02076	0.03645	0.01718		
•Solubility in pure water based on "a numbe based on activity coefficients calculated fro	er of determi m (1):	nations," and a value of $\log K_{s0} = -4.2764$ was given		
$\log y_{\pm}^2 = -I^{1/2}/2$	'{1 + I <sup>1/2</sup> } -	0.21		
Ion pairing of AgBrO <sub>3</sub> was estimated and ac	ccounted for	in this calculation of $K^{0}_{10}$ .		
In addition to the thermodynamic solubility	product, the	following equilibrium constants were evaluated:		
$K_1 = [Ag^+][C_2H_4NO$	) <sub>2</sub> -]y <sub>±</sub> ²/[Ag(C	2H4NO2)]		
$K_2 = [Ag(C_2H_4NO_2)$	][C <sub>2</sub> H <sub>4</sub> NO <sub>2</sub> -]	/[Ag(C2H4NO2)2-]		
For the above equilibria, the authors give K	$C_1 = 3.0 \times 10^{-10}$	-4 mol dm <sup>-3</sup> , and $K_2 = 4.2 \times 10^{-4} \text{ mol dm}^{-3}$ .		
AU	XILIARY IN	<b>VFORMATION</b>		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
· · · · · · · · · · · · · · · · · · ·				
Saturating column method used. The broma tration in the saturated solutions was determ addition of excess KI to about 25 cm <sup>3</sup> aliqu by addition of about 15 cm <sup>3</sup> of 1 mol dm <sup>-3</sup> The aliquots were then titrated with standar fate solution to the starch endpoint.	ate concen- nined by ots followed $H_2SO_4$ . rd thiosul-	AgBrO <sub>3</sub> crystals were prepared by addition of dilute solutions of A.R. grade KBrO <sub>3</sub> and AgNO <sub>3</sub> to a large volume of hot water. The product was washed and dried. AR grade glycine was used after drying in a vacuum		
		oven at 90°C for several hours.		
		ESTIMATED ERROR:		
		Soly: nothing specified.		
		Temp: precision ± 0.02 K.		
		BEEBENAEG		
		REFERENCES: 1. Monk, C. B. Trans. Faraday Soc. <u>1951</u> , 47, 285.		

# Cilver Br

COMPONENTS:			ORIGINAL	MEASUREMENTS:
(1) Silver bromate: AgBrO <sub>3</sub> : [7783-89-3]			Monk, C. B.	
(2) Sodium hydroxide: Nat	OH: [1310_73_2]			
(2) Silver sitester As)(0)				- J C 1051 47 202 7
(3) Silver mirate; AginO <sub>3</sub> ;	[//01-00-0]		Irans. Far	aday Soc. <u>1951</u> , 47, 292-7.
(4) Glycine; $C_2H_5NO_2$ ; [56	-40-6]			
(5) Water; $H_2O$ ; [7732-18-	5]			
VARIABLES:		•	PREPAREI	) BY:
Concentrations of NaOH.	AgNO <sub>2</sub> and glycine		- 102- 11002	
T/K = 298.15			H. Mivamoto and E. M. Woolley	
				·
EVEDIMENTAL DATA.	• <del>••</del> •••••••••••••••••••••••••••••••••		L	
EATERIMENTAL DATA.				
		- 4 - 1 7/		
total NaOH	total [AgNO <sub>3</sub> ]	otal [C	2H5NO2]	AgBrO <sub>3</sub> soly
mol dm-3	mol dm-3	mol	dm-3	mol dm <sup>-3</sup>
0.0	0.0	0.0		0.00809*
0.00217	0.02971	0.0	3250	0.00275
0.00707	0.03243	0.0	3250	0.00288
0.00449	0.01883	0.0	1544	0.00422
0.01048	0.01462	0.0	2440	0.00599
0.01048	0.01402	0.0	2747	0.00333
*Solubility in pure water b based on activity coefficie	based on "a number of de ints calculated from (1):	termi	nations," and	i a value of $log K_{s0}^{0} = -4.2764$ was given
	$\log y_{\pm}^2 = -I^{1/2}/(1 + I^{1/2})$	<sup>/2</sup> } -	0.21	
Ion pairing of AgBrO <sub>3</sub> wa	s estimated and accounted	d for	in this calcu	llation of K0 <sub>\$0.</sub>
In addition to the thermod	lynamic solubility produc	t, the	following e	quilibrium constant was evaluated:
V				
K1	$= [Ag^+][C_2H_4NO_2^-]y_{\pm}^{*}/[$		$_{2}H_{4}NO_{2}$	
For the above equilibrium	, the author reported $K_1$	<b>=</b> 3.0	x 10-4 mol	dm-3.
	AUXILIA	RY IN	FORMATIC	DN
METHOD/APPARATUS/	PROCEDURE:		SOURCE A	ND PURITY OF MATERIALS:
Saturating column method	used. The bromate conc	en-	AgBrO <sub>3</sub> cry	stals were prepared by addition of dilute
tration in the saturated sol	utions was determined by	v	solutions of	A.R. grade KBrO, and AgNO, to a large
addition of excess KI to a	hout 25 cm <sup>8</sup> aliquots follo	owed	volume of 1	ot water. The product was washed and
hy addition of shout 15 or	na of 1 mol dm-8 H-SO.		dried	iot water The product was washed and
by addition of about 15 ch	no of 1 mor um o m2504.		diffed.	
The aliquots were then titl	rated with standard thiost	ui-		
fate solution to the starch	endpoint.		AR grade g	lycine was used after drying in a vacuum
			oven at 900	C for several hours.
1			ESTIMATE	D FRROR
			Solv noth!-	
			Tommer	
			remp: prec	1510A ± 0.02 K.
			<u> </u>	
			REFERENC	CES:
		(	1. Monk, C	. B. Trans. Faraday Soc. <u>1951</u> , 47, 285.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) DL-Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ; [302-72-7] (4) Water; H <sub>2</sub> O; [7732-18-5]	0 1 1	RIGINAL MEASUREMENTS: Monk, C. B. Frans. Faraday Soc. <u>1951</u> , 47, 292-7.
VARIABLES: Concentrations of NaOH and alanine T/K = 298.15	P. I	REPARED BY: H. Miyamoto
EXPERIMENTAL DATA:		
total NaOHtotal $[C_3H_7NC]$ mol dm <sup>-3</sup> mol dm <sup>-3</sup> 0.012600.025680.014800.042590.020760.036320.023720.03378From the above data, the following equilibrium constant the AgBrO3-NaOH-glycine-H2O system for complete detection		AgBrO <sub>3</sub> soly mol dm <sup>-3</sup> 0.01363 0.01483 0.01734 0.01861 were evaluated (see the compilation by this author for ils):
$K_1 = [Ag^+][C_3H_6NO_2^-]y_{\pm}^2/[$	Ag(C <sub>3</sub> H <sub>6</sub> NO <sub>2</sub> )]	$= 2.0 \times 10^{-4} \mod dm^{-3}$

and

 $K_2 = [Ag(C_3H_6NO_2)][C_3H_6NO_2^-]/[Ag(C_3H_6NO_2)_2^-] = 2.9 \times 10^{-4} \text{ mol dm}^{-3}$ 

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
See the compilation by this author for the AgBrO <sub>3</sub> -	Reagent grade alanine was recrystallized from aqueous	
NaOH-glycine-H <sub>2</sub> O system for complete details.	alcohol and dried in vacuum for several hours at 90°C.	

COMPONENTS: (1) Silver bromate; AgBr (2) Sodium hydroxide; N (3) Silver nitrate; AgNO; (4) DL-Alanine; C <sub>3</sub> H <sub>7</sub> N( (4) Water: H O: (7732, 1)	O <sub>3</sub> ; [7783-89-3] laOH; [1310-73-2] 3; [7761-88-8] O <sub>2</sub> ; [302-72-7]		ORIGINAL Monk, C. B Trans. Fara	MEASUREMENTS: .day Soc. <u>1951,</u> 47, 292-7.
VARIABLES: Concentrations of NaOH, AgNO <sub>3</sub> and <i>DL</i> -alanine T/K = 298.15		PREPARED H. Miyamor	BY:	
EXPERIMENTAL DATA	<b>\:</b>		•	
total NaOH mol dm <sup>-3</sup> 0.00117 0.00100 0.00347 0.00396 From the above data, the the AgBrO <sub>3</sub> -NaOH-glyci	total [AgNO <sub>3</sub> ] mol dm <sup>-3</sup> 0.02940 0.02437 0.02038 0.01889 e following equilibriun ine-H <sub>2</sub> O system for co.	total (4 mol 0.0 0.0 0.0 0.0 n constant mplete de	C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ] dm <sup>-3</sup> 1535 1535 1535 3098 t was evaluate tails):	AgBrO <sub>3</sub> soly mol dm <sup>-3</sup> 0.00273 0.00304 0.00366 0.00410 ed (see the compilation by this author for
$K_1 = [A_1]$	g+][C3H6NO2-]y±2/[Ag(	(C <sub>3</sub> H <sub>6</sub> NO <sub>2</sub>	$()] = 2.2 \times 10^{-10}$	0-4 mol dm-3
	AUXII	LIARY IN	FORMATION	۷
METHOD/APPARATUS See the compilation by the NaOH-glycine-H <sub>2</sub> O system	/PROCEDURE: his author for the AgB em for complete detail:	rO <sub>3</sub> - s.	SOURCE AN Reagent grac alcohol and (	<b>ND PURITY OF MATERIALS:</b> le alanine was recrystallized from aqueous dried in vacuum for several hours at 90°C.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate: AgBrOs: 17783-89-31	
(2) Sodium hydroxide: $N_2OH$ ; [1310-73-2]	Monk C B
(2) N Church church C H N $O$ (556 50.2)	Trane Freedow See 1051 47 202 7
(5) N-Orycyr grycine; $C_4H_8N_2O_3$ ; [550-50-5]	Irans. Faraday Soc. <u>1991</u> , 47, 292-7.
(4) water; $H_2O$ ; [7/32-18-5]	
VARIABLES:	PREPARED BY:
Concentrations of NaOH and glycyl glycine	II Minamata
1/K = 276.13	n. Miyamoto
EXPERIMENTAL DATA:	
total [NaOH] total [C <sub>4</sub> H <sub>8</sub> ]	V <sub>2</sub> O <sub>3</sub> ] AgBrO <sub>3</sub> soly
mol dm <sup>-3</sup> mol dm <sup>-3</sup>	mol dm <sup>-3</sup>
0.0 0.0	0.00809*
0.00536 0.01346	0.01037
0.00710 0.01401	0.01111
0.00830 0.02035	0.01168
0.01524 0.02495	0.01462
*Solubility in pure water based on "a number of determ based on activity coefficients calculated from (1):	inations," and a value of $log \text{ K0}_{s0} = -4.2764$ was given
$\log y_{\pm^2} = -I^{1/2}/\{1 + I^{1/2}\} -$	0.21
Ion pairing of AgBrO <sub>3</sub> was estimated and accounted for	in this calculation of $K_{s0,}^{0}$
In addition to the thermodynamic solubility product, the	e following equilibrium constant was evaluated:
$K_1 = [Ag^+][C_4H_7N_2O_3^-]y_+^2/[Ag($	C4H7N2O3)]
For the above equilibrium, the author reported $K_1 = 2.0$	)7 x 10 <sup>-3</sup> mol dm <sup>-3</sup> .
· · · · · · · · · · · · · · · · · · ·	
AUXILIARY II	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Saturating column method used. The bromate concen-	AgBrO <sub>3</sub> crystals were prepared by addition of dilute
tration in the saturated solutions was determined by	solutions of A.R. grade KBrO <sub>3</sub> and AgNO <sub>3</sub> to a large
addition of excess KI to about 25 cm <sup>3</sup> aliquots followed	volume of hot water. The product was washed and
by addition of about 15 cm <sup>3</sup> of 1 mol dm <sup>-3</sup> $H_2SO_4$ .	dried.
The aliquots were then titrated with standard thiosul-	1
fate solution to the starch endpoint.	Glycyl glycine (Roche product) was dried in a vacuum
	oven at 90°C for several hours.
	ESTIMATED EDDOD.
	Solu nothing manificat
	Tomp: provide to 0.25 T
	1 emp: precision $\pm$ 0.02 K.
	REFERENCES:
	1. Monk, C. B. Trans. Faraday Soc. <u>1951</u> , 47, 285.
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#### Silver Bromate

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>(1) Silver bromate; AgBrO<sub>3</sub>; [7783-89-3]</li> <li>(2) Lithium nitrate; LiNO<sub>3</sub>; [7790-69-4]</li> <li>(3) Perchloric acid; HClO<sub>4</sub>; [7601-90-3]</li> </ol>	Ramette, R. W.; Spencer, J. B. J. Phys. Chem. <u>1963</u> , 67, 944-6
(4) Deuterium oxide (water- $d_2$ ); $D_2O$ ; [7789-20-0]	
VARIABLES: Concentration of LiNO <sub>3</sub>	PREPARED BY:
T/K = 298	E. M. Woolley

## EXPERIMENTAL DATA:

The aqueous (H<sub>2</sub>O) perchloric acid concentration of all solutions is  $1 \times 10^{-4}$  mol dm<sup>-3</sup>. The acid was added to supress hydrolysis. The authors state that there is a tendency for silver to form hydroxy complexes.

AgBrO <sub>3</sub> solyª
mmol dm-3
6.78
8.20 <sup>b</sup>
8.68
9.15
9.54

<sup>a</sup>Using the Davies equation to estimate activity coefficients, the authors computed the thermodynamic solubility product:  $log K_{0,0} = -4.412$ .

<sup>b</sup>Judging by the constancy of the ratio of the solubility of  $AgBrO_3$  in  $D_2O$  and  $H_2O$ , the authors conclude that this data point is too high by about 1 %.

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS:		
Complete details given in the compilation of these	Heavy water (General Dynamics Corp.) was specified	
authors' study of the AgBrO <sub>3</sub> -LiNO <sub>3</sub> -HClO <sub>4</sub> -H <sub>2</sub> O	to be greater than 99.5 % pure.	
ystem.		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
(2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]	Ramette, R. W.; Spencer, J. B.
(3) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]	J. Phys. Chem. <u>1963</u> , 67, 944-6
(4) Deuterium oxide (water- $d_2$ ); $D_2O$ ; [7789-20-0]	
VARIABLES:	PREPARED BY:
Concentration of LiClO <sub>4</sub>	
T/K = 298	E. M. Woolley

#### EXPERIMENTAL DATA:

The aqueous (H<sub>2</sub>O) perchloric acid concentration of all solutions is  $1 \times 10^{-4}$  mol dm<sup>-3</sup>. The acid was added to supress hydrolysis. The authors state that there is a tendency for silver to form hydroxy complexes.

LiClO <sub>4</sub> concn	AgBrO <sub>3</sub> soly
mol dm-3	mmol dm-3
0.0	6.78
0.03	7.46
0.075	7.86
0.15	8.32
0.225	8.60
0.30	8.84

\*Using the Davies equation to estimate activity coefficients, the authors computed the thermodynamic solubility product:  $log K_{0,0}^{0} = -4.412$ .

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: Complete details given in the compilation of these authors' study of the AgBrO <sub>3</sub> -LiClO <sub>4</sub> -HClO <sub>4</sub> -H <sub>2</sub> O system.	SOURCE AND PURITY OF MATERIALS: Heavy water (General Dynamics Corp.) was specified to be greater than 99.5 % pure.	

COMPONENTS: (1) Silver bromate; AgBrO <sub>s</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS:
(2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]	Ramette, R. W.; Dratz, E. A.
(3) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]	J. Phys. Chem. <u>1963</u> , 67, 940-2
(4) Deuterium oxide (water- $d_2$ ); $D_2O$ ; [7789-20-0]	
VARIABLES:	PREPARED BY:
Concentration of LiClO <sub>4</sub> T/K = 298.9, 298.2 and 308.2	G. Jancso and E. M. Woolley

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The aqueous (H<sub>2</sub>O) perchloric acid concentration of all solutions is  $1 \times 10^{-4}$  mol dm<sup>-3</sup>. The acid was added to supress hydrolysis.

t/ºC	LiClO <sub>4</sub> concn mol dm <sup>-3</sup>	AgBrO <sub>3</sub> soly mmol dm <sup>-3</sup>	
14.7	0.0 0.025	4.54 4.94	
	0.050	5.16	
	0.075	5.30	1
	0.100	5.42	
25.0	0.0	6.76	
	0.025	7.33	
	0.050	7.65	
	0.075	7.89	
	0.100	8.02	
35.0	0.0	9.57	
	0.025	10.26	
	0.050	10.62	
	0.075	10.92	
	0.100	11.12	
		continued	
	AUXILIARY IN	IFORMATION	
METHOD/APPARATUS/PROCEDURI	2:	SOURCE AND PURITY OF MATERIALS:	
A large excess of AgBrO <sub>3</sub> was added to	the solutions of	AgBrO <sub>3</sub> prepared by slow addition of solutions	of
LiClO <sub>4</sub> and HClO <sub>4</sub> . The solutions were	rotated in	AgNO <sub>3</sub> and KBrO <sub>3</sub> to distilled water at room	
borosilicate glass bottles for two days in	n a thermostat at	temperature. The product was washed, dried, a	nd
38°C, and were then transferred to a w	ater bath	recrystallized. The purity of this product was c	leter-
thermostated at either 35, 25 or 14.7°C. The bottles		mined gravimetrically as AgBr (99.8 %) and by	
were thermostated at the desired tempe	rature for 3	iodometric titration (99.7 %).	
days with occasional shaking. The satu	rated solutions		
were filtered through fine norous glass			
were intered unough the porous Biase	by pressure,	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad	e
and aliquots were pipetted into titration	by pressure, flasks. The	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials.	8
and aliquots were pipetted into titration solutions were analyzed for bromate by	by pressure, flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials.	e
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam	e nics
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, a flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5	e nics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, n flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR:	e nics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, n flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR: Soly: nothing specified, but see next page.	e nics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, n flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR: Soly: nothing specified, but see next page. Temp: precision probably better than ± 0.1 K (compiler)	e nics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, a flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR: Soly: nothing specified, but see next page. Temp: precision probably better than ± 0.1 K (compiler).	e hics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, n flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR: Soly: nothing specified, but see next page. Temp: precision probably better than ± 0.1 K (compiler). REFERENCES:	e nics %.
and aliquots were pipetted into titration solutions were analyzed for bromate by titration.	by pressure, a flasks. The iodometric	LiClO <sub>4</sub> and HClO <sub>4</sub> were analytical reagent grad materials. Heavy water was obtained from General Dynam Corp. with a specified purity greater than 99.5 ESTIMATED ERROR: Soly: nothing specified, but see next page. Temp: precision probably better than ± 0.1 K (compiler). REFERENCES:	e hics %.

Silver	Bromate
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COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		
(2) Lithium perchlorate; LiClO <sub>4</sub> ; [7791-03-9]	Ramette, R. W.; Dratz, E. A.	
(3) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]	J. Phys. Chem. <u>1963</u> , 67, 940-2	
(4) Deuterium oxide (water-d <sub>2</sub> ); D <sub>2</sub> O; [7789-20-0]		
(4) Deuterium oxide (water- $d_2$ ); D <sub>2</sub> O; [7789-20-0]		

EXPERIMENTAL DATA: (continued.....)

The thermodynamic solubility product was evaluated from  $K_{00}^0 = S^2y^2$  where S is the solubility and y is the activity coefficient estimated from the following equations:

where

 $log y = -AI^{1/2}/(1 + BI^{1/2})$ 

 $I = S + [LiClO_4] + [HClO_4]$ 

The results of these calculations and the computed thermodynamic functions are given below.

	Α	В	-log K0,0
t∕⁰C	mol <sup>-1/2</sup> dm <sup>-3/2</sup>	mol <sup>-1/2</sup> dm <sup>-3/2</sup>	± 0.006ª
14.7	0.507	1.55	4.749
25.0	0.515	1.56	4.414
35.0	0.525	1.82	4.126
	ΔG <sup>0</sup>	ΔH0	<b>ΔS</b> 0
t/ºC	kcal mol-1	kcal mol-1	cal K-1 mol-1
25.0	6.02 ± 0.01	$12.5 \pm 0.4$	21.8 ± 1.3

\*All ± quantities given in the above tables are uncertainties "estimated for 50 % confidence."

COMPONENTS:		DRIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783	-89-3]	Ome B B
(2) Methanol; CH <sub>4</sub> O; [67-56-1]		Owen, B. B.
		J. Am. Chem. Soc. <u>1933</u> , 55, 1922-8.
(3) Water; H <sub>2</sub> O; [7732-18-5]		
VARIARI EC.		
Solvent composition		REPARED BI:
T/K = 298		H. Miyamoto and M. Salomon
EXPERIMENTAL DATA:		<u></u>
methanol content	AgBrO <sub>3</sub> soly	density
mass % mol 9	%a mmol dm-	-3 kg dm-3

111235 70	11101 904	mmot am •	kg ulli
0 .	0	8.12 <sup>b</sup>	0.9987
10	5.9	5.51	0.9802
20	12.3	3.79	0.9650
30	19.4	2.65	0.9492
40	27.3	1.82	0.9318
50	36.0	1.24	0.9123
60	45.8	0.83	0.8908

\*Calculated by the compiler.

<sup>b</sup>Mean of four independent measurements with an average deviation of 0.004 mmol dm<sup>-3</sup>.

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Three to four grams of $AgBrO_3$ crystals were placed in long-necked 200 to 500 cm <sup>3</sup> flasks. Ice-cold solvent was quickly introduced into the flasks without wetting the necks, and the flasks were sealed. The flasks were rotated slowly for five or six days at 25°C. Prelimi- nary studies indicated that equilibrium was reached within two days. After 2-3 days, the solutions became turbid.	AgBrO <sub>3</sub> was prepared from dilute solutions of Baker's "Analyzed" grade AgNO <sub>3</sub> and KBrO <sub>3</sub> . Equivalent volumes of these two solutions were slowly mixed, and the resulting precipitate was washed and recrystallized from conductivity water. Methanol, Baker's "Analyzed" grade, "absolute," was used without further purification.	
The saturated solutions were forced through asbestos- glass wool filtering mats, and 100 to 400 g samples were weighed. The Ag content was determined gravimetrically as AgBr.	ESTIMATED ERROR: Soly: av deviation given above. Precision of all results not specified. Temp: nothing specified.	
For the mixed solvents, the solubilities were deter- mined on a mass basis and converted to mol dm <sup>-3</sup> units using the density values given in the table.	REFERENCES:	

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver bromate: AgBrOs: [7783-89-3]			
		Neuman, E. W.	
(2) Methanol: CH <sub>4</sub> O: [67-56-1]			
		J. Am. Chem. Soc. 1934 56, 28-9	
(3) Water: H <sub>2</sub> O: [7732-18-5]		1. mil. enem. 500. <u>1221</u> , 50, 20 3.	
VARIABLES:		PREPARED BY:	
T/K = 298		H. Miyamoto	
-,			
EXPERIMENTAL DATA:			
methanol content	:	AgBrO <sub>3</sub> soly	
mass %	mol %ª	mmol dm-3	
0	0	8.131	
3.62	2.07	7.00	
7.31	4.25	6.05	
11.08	6.55	5.22	
14 92	8 97	4 50	
18.84	11 54	3.94	
22.83	14.26	3.40	
22.05	14.20	2.40	
20.91	20.22	2.52	
25 22	20.23	2.55	
30.67	25.50	1.94	
39.07	20.99	1.84	
44.11	30.74	1.58	
48.03	34.74	1.31	
······································		IEODMATION	
METHOD/APPARATUS/PROCEDU	RE:	SOURCE AND PURITY OF MATERIALS:	
Equilibrium was reached by rotating	solid AgBrO <sub>3</sub> with	AgBrO <sub>3</sub> was prepared by adding a dilute solution of	
the mixed solvents in a thermostat at	25°C. The	$KBrO_3$ to a dilute solution of AgNO <sub>3</sub> . The precipitate	
saturated solutions were analyzed for	silver by	was washed, filtered and suspended in water for	
potentiometric titration with KBr usi	ng the following	several days to remove traces of KBrO <sub>3</sub> and AgNO <sub>3</sub> .	
type of cell:			
		The source and purity of methanol was not given.	
Cu   Agar Ba(NO <sub>2</sub> ) <sub>2</sub>    unknown	AoBr Ao		
		ESTIMATED ERROR:	
		Nothing specified	
		Nothing specified.	
		REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver biomate, Agbios, [7763-67-5]	Miyamoto, H.
(2) Methanol; CH <sub>4</sub> O; [67-56-1]	Nippon Kagaku Zasshi <u>1960,</u> 81, 1376-80.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Concentration of methanol $T/K = 293.15$ , 298.15 and 303.15	H. Miyamoto

methanol content		silver bromate solubility/mmol dm-3		
mass %	mol %ª	20ºC	25ºC	30ºC
0.0	0.0	7.28	8.59	10.02
6.012	3.472	5.57	6.71	7.85
9.846	5.785	4.78	5.67	6.72
19.736	12.146	3.47	4.21	4.87
29.942	19.374	2.56	2.99	3.46
33.448	22.032	2.22	2.73	3.19
43.170	29,928	1.69	2.07	2.32
55.032	40.761	1.18	1.36	1.64
69.140	55.746	0.78	0.97	1.06

<sup>a</sup>Calculated by the compiler.

### AUXILIARY INFORMATION

Excess AgBrO <sub>3</sub> and mixed solvent were placed into
glass-stoppered bottles. The bottles were rotated in a
thermostat at a given temperature for 72 hours which
was sufficient time to reach equilibrium. After the
solid was allowed to settle, aliquots of saturated
solution were withdrawn and the solubility was
determined by analysis for total silver.

METHOD/APPARATUS/PROCEDURE:

To each aliquot of saturated solution, a measured excess of 0.050 mol dm<sup>-3</sup> of NaCl solution was added, and the remaining chloride titrated with 0.025 mol dm<sup>-3</sup> AgNO<sub>3</sub> using dichlorofluorescein indicator.

#### SOURCE AND PURITY OF MATERIALS:

AgBrO<sub>3</sub> prepared by addition of dilute solutions of AgNO<sub>3</sub> and KBrO<sub>3</sub> (Wako Co. guaranteed reagent) to a large volume of dilute KNO<sub>3</sub> solution. The solution was boiled, aged, and the precipitate washed and dried under reduced presure.

Methanol (Wako Co. guaranteed reagent) was dried over CaO, refluxed over AgNO<sub>3</sub>, and distilled.

#### **ESTIMATED ERROR:**

Soly: probable error within  $\pm$  0.023 mmol dm<sup>-3</sup>. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

COMPONENTS:			ORIGI	NAL MEASUREMENT	S:
(1) Silver bromate; Ag	BrO <sub>3</sub> ; [7783-89-3]				
(2) Sodium hydroxide:	NaOH: [1310-73-2]		Davies	. P. B.: Monk, C. B.	
(2) Solution hydroxide, $(1310-75-2)$ (3) A setic acid: C.H.O.: $(64-19-7)$				,	
(4) Methanol: CH.O. I	67-56-11		I Che	m Sec 1051 2718-23	
(4) Weten H O. (7722	19 51		J. C.I.	:m. 50c. <u>1751</u> , 2/10-25	
(5) water; H <sub>2</sub> O; [7/52-	-18-5]				
VARIABLES:			PREPA	RED BY:	
Concentrations of NaC	OH, CH <sub>3</sub> COOH and CH	3OH			
T/K = 298.15			H. Mi	yamoto	
EXPERIMENTAL DA	ТА:				
CH <sub>3</sub> OH content	CH <sub>3</sub> OH content <sup>a</sup>	NaOH c	oncn	CH <sub>3</sub> COOH concn	AgBrO <sub>8</sub> soly
mass %	mol %	mol dm	-3	mol dm-3	mmol dm <sup>-3</sup>
43.5	30.2	n		0	1.58
	20.2	0.0105	2	0 02272	212
		0.0195	5	0.02272	2.13
		0.0312	~	0.03/80	2.33
		0.0390	6	0.05679	2.47
53.8	39.6	0		0	1.09
[		0.0195	3	0.02272	1.58
		0.0312	5	0.03563	1.78
		0.0351	5	0.04165	1.84
1					
	AUX	ILIARY IN	FORMA		
METHOD/APPARATI	JS/PROCEDURE:		SOURC	CE AND PURITY OF N	IATERIALS:
The saturating column	method was used. Satu	urated	AgBrO	s crystals were prepared	l by adding dilute
solutions were analyzed	d for bromate by additi	ion of	solution	is of (A.R. grade) KBr(	O <sub>3</sub> and AgNO <sub>3</sub> to a large
excess KI to about 25	cm <sup>3</sup> aliquots followed b	у	volume of hot water. The precipitate was washed and		
addition of about 15 c	m <sup>3</sup> of 1 mol dm <sup>-3</sup> H <sub>2</sub> SC	D <sub>4</sub> . The	dried.		
aliquots were then titra	ated with standard thios	sulfate			
solution using a starch	indicator.		AnalaR	acetic acid was used.	"Laboratory grade"
-			methan	ol was used.	
		-			
			ESTIM.	ATED ERROR:	
		Soly: nothing specified.			
			Temp: 1	precision $\pm$ 0.03 K.	
			REFER	ENCES:	······
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COMPONENTS:		ORIGINAL MEA	SUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783	-89-3]			
(2) Ethanol; C <sub>2</sub> H <sub>6</sub> O; [64-17-5]		Owen, B. B.		
(3) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Chem. S	oc. <u>1933,</u> 55, 1922-8.	
			ا د	
VARIABLES:		PREPARED BY:		
T/K = 298		H. Miyamoto an	d M. Salomon	
EXPERIMENTAL DATA:				
CH <sub>3</sub> CH <sub>2</sub> OH	content	AgBrO <sub>3</sub> soly	density	
mass %	mol %ª	mmol dm <sup>-3</sup>	kg dm <sup>-3</sup>	
0	0	8.12 <sup>b</sup>	0.9987	
10	4.2	5.53	0.9804	
20	8.9	3.86	0.9664	
30	14.4	2.78	0.9507	
40	20.7	1.97	0.9315	
50	28.1	1.36	0.9099	
<sup>a</sup> Calculated by the compiler.				
<sup>b</sup> Mean of 4 independent determin	ations: average deviat	ion reported as 0.00	04 mmol dm <sup>-3</sup> .	
	AUXILIARY I	NFORMATION		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
All procedures identical to those given in the compila-		Absolute ethanol was distilled first from KOH and then		
tion of this author's study of the		from $Ag_2O$ . See the compilation cited on the left for		
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.		other details.		

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89	9-3]		
(2) Ethanol; C <sub>2</sub> H <sub>6</sub> O; [64-17-5]	-	Neuman, E. W.	
(3) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Chem. Soc. <u>1934</u> , 56, 28-9.	
VARIABLES:		PREPARED BY:	
Solvent composition			
T/K = 298		H. Miyamoto	
EXPERIMENTAL DATA:			
CH <sub>3</sub> CH <sub>2</sub> OH o	content	AgBrO <sub>3</sub> solubility	
mass %	mol %ª	mmol dm <sup>-3</sup>	
0	0	8.131	
3.62	1.45	7.00	
7.30	2.99	6.06	
11.06	4.64	5.27	
14.89	6.40	4.55	
18.84	8.32	3.97	
22.80	10.35	3.46	
30.79	14.82	2.63	
35.29	17.58	2.23	
39.62	20.42	1.94	
44.06	23.55	1.65	
48.59	26.99	1.40	
<sup>a</sup> Calculated by the compiler.			
	AUXILIARY IN	NFORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
All procedures identical to those given in the compila-		Source and purity of ethanol not given. See the	
tion of this author's study of the		compilation cited on the left for other details.	
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.			

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# Silver Bromate

COMPONENTS: (1) Silver bromate: AgBrOs: 17783-89-31	ORIGINAL MEASUREMENTS:
(1) Etherely C. H. O. 164, 17, 51	Miyamoto, H.; Koizumi, E.
(2) Ethanol; $C_2H_6O$ ; [64-17-5]	Nippon Kagaku Zasshi <u>1956,</u> 77, 1255-9.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
T/K = 293.15, 298.15 and 303.15	H. Miyamoto

# EXPERIMENTAL DATA:

CH <sub>3</sub> CH	CH <sub>3</sub> CH <sub>2</sub> OH content		silver bromate solubility/mmol dm-3		
mass %	mol %ª	20ºC	25°C	30ºC	
0.0	0.0	7.28	8.59	10.02	
3.729	1.492	6.30	7.33	8.79	
8.161	3.358	5.30	6.24	7.54	
14.917	6.416	4.26	4.94	6.03	
22.072	9.971	3.36	3.88	4.77	
26.689	12.462	2.86	3.39	4.04	
35.359	17.621	2.18	2.69	3.17	
44.039	23.532	1.76	1.99	2.40	
54.871	32.225	1.31	1.47	1.70	
71.079	49.008	0.77	0.86	0.96	
82.728	65.193	0.57	0.61	0.67	

<sup>a</sup>Calculated by the compiler.

# AUXILIARY INFORMATION

METHOD/ADDADATUS/DDOCEDUDE.	SOURCE AND PURITY OF MATERIALS
METHOD/ATTAKATOS/TROCEDORE.	SOURCE AND FORTH OF MATERIALS.
Excess $AgBrO_3$ and mixed solvent were placed into glass-stoppered bottles. The bottles were rotated in a thermostat at a given temperature for 72 hours which was sufficient time to reach equilibrium. After the solid was allowed to settle, aliquots of saturated solution were withdrawn and the solubility was determined by analysis for total silver.	AgBrO <sub>3</sub> prepared by addition of dilute solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> (Takeda Co. guaranteed reagent) to a large volume of hot dilute KNO <sub>3</sub> solution. The solution was boiled, aged, and the precipitate washed and dried under reduced presure. Ethanol (Japan government guaranteed reagent) was refluxed over AgNO <sub>3</sub> and H <sub>2</sub> SO <sub>4</sub> , and then distilled.
To each aliquot of saturated solution, a measured excess of 0.050 mol dm <sup>-3</sup> of NaCl solution was added, and the remaining chloride titrated with 0.025 mol dm <sup>-3</sup> AgNO <sub>3</sub> using dichlorofluorescein indicator.	ESTIMATED ERROR: Soly: probable error within ± 0.04 mmol dm <sup>-3</sup> . Temp: precision ± 0.02 K.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7/83-89-3] (2) Sodium hydroxide; NaOH; [1310-73-2]	Davies, P. B.; Monk, C. B.
(3) Acetic acid; $C_2H_4O_2$ ; [64-19-7] (4) Ethanol; $C_2H_6O$ ; [64-17-5]	J. Chem. Soc. <u>1951</u> , 2718-23.
(5) water; H <sub>2</sub> O; [//32-18-5]	
VARIABLES: Concentrations of NaOH, CH <sub>3</sub> COOH and CH <sub>3</sub> CH <sub>2</sub> OH	PREPARED BY:
T/K = 298.15	H. Miyamoto

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CH <sub>3</sub> CH <sub>2</sub> OH mass %	content mol %ª	NaOH concn mol dm <sup>-3</sup>	CH <sub>3</sub> COOH concn mol dm <sup>-3</sup>	AgBrO <sub>3</sub> soly mmol dm <sup>-3</sup>
29.5	14.0 <sub>6</sub>	0	0	2.69
		0.03906	0.04544	3.86
		0.06636	0.06700	4.28
	21.00	0	0	1.86
40.6		0.03906	0.04544	3.05
		0.04687	0.05301	3.20
53.3	20.0	٥	0	1.14
36.6	27.73	0.01052	0 00070	1.17
		0.01953	0.02272	1.00
		0.03515	0.04166	2.25

<sup>a</sup>Calculated by the compiler.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The saturating column method was used. Saturated solutions were analyzed for bromate by addition of excess KI to about 25 cm <sup>3</sup> aliquots followed by addition of about 15 cm <sup>3</sup> of 1 mol dm <sup>-3</sup> H <sub>2</sub> SO <sub>4</sub> . The aliquots were then titrated with standard thiosulfate solution using a starch indicator.	AgBrO <sub>3</sub> crystals were prepared by adding dilute solu- tions of (A.R. grade) KBrO <sub>3</sub> and AgNO <sub>3</sub> to a large volume of hot water. The precipitate was washed and dried. AnalaR acetic acid was used. "Laboratory grade" ethanol was used.			
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.03 K.			
	REFERENCES:			

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COMPONENTS:			ORIG	INAL MEASUREMENTS	5:		
(1) Silver bromate; AgBrO <sub>3</sub> ; $[7783-89-3]$							
(2) Sodium hydroxide; NaOH; [1310-73-2]			Davie	s, P. B.; Monk, C. B.			
(3) Acetic acid; $C_2H_4O_3$	(3) Acetic acid; $C_2H_4O_2$ ; [64-19-7]						
(4) 1,2-Ethanedioi (eth)	(4) 1,2-Ethanediol (ethylene glycol); C <sub>2</sub> H <sub>6</sub> O <sub>2</sub> ;		J. Chem. Soc. <u>1951</u> , 2718-23.				
[107-21-1] (5) Water: M. O. (7722. 1	10 51						
(5) water; H <sub>2</sub> O; [7/52-]	[6-5]			<u> </u>			
VARIABLES:			PREP	ARED BY:			
HOCH CH.OH	Concentrations of NaOH, CH <sub>3</sub> COOH and		II Minamata				
T/K = 298.15			H. Miyamoto				
EXPERIMENTAL DAT	'A:		1 <u>_</u>	····			
HOCH <sub>2</sub> CH <sub>2</sub> OH	HOCH <sub>2</sub> CH <sub>2</sub> OH content NaOH (		oncn	CH <sub>3</sub> COOH concn	AgBrO <sub>3</sub> solv		
mass %	mol %a	mol dn	1-3	mol dm-3	mmol dm-3		
39.3	39.3 15.8 <sub>2</sub> 0 0.056			0	5.28		
			6	0.1178	6.98		
51.2	23.34	0		0	4.61		
		0.0244	0	0.02840	5.52		
		0.0439	2	0.05206	6.06		
63.1	33.17	0		0	3.98		
		0.0244	0	0.02840	4.91		
•Calculated by the com	piler.						
	AU	XILIARY IN	FORM	ATION			
METHOD/APPARATUS/PROCEDURE;			SOURCE AND PURITY OF MATERIALS:				
Procedures identical to those in the compilation of			"Laboratory grade" ethylene glycol was used. Other				
these authors' study of the			details given in the compilation cited on the left.				
AgBrO3-NaOH-CH3COOH-CH3CH2OH-H2O system.				-			

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]							
(2) 1,2-Ethanediol (ethylene glycol); C <sub>2</sub> H <sub>6</sub> O <sub>2</sub> ;				Owen, B B.			
[107-21-1]				J. Am. Chem. Soc. <u>1933</u> , 55, 1922-8.			
(3) Water;	H <sub>2</sub> O; [7732-18-5]						
VARIABLES:				PREPARED BY:			
Solvent composition							
T/K = 298				H. Miyamoto and M. Salomon			
EXPERIM	ENTAL DATA:						
	HOCH <sub>2</sub> CH <sub>2</sub> OH content AgI			rO <sub>3</sub> soly	density		
	mass %	mol %ª	mmol dm-3		kg dm <sup>-3</sup>		
	0	0	8.12 <sup>b</sup>		0.9987		
	10	3.1	7.26		1.0097		
Ì	20	6.8	6.50		1.0228		
	30	11.1	5.85		1.0362		
	40	16.2	5.	26	1.0496		
	50	22.5	4.	70	1.0624		
	70	40.4	3.	61	1.0851		
*Calculated	i by the compiler.						
		AUXILIA	ARY IN	FORMATIO	N		
METHOD/APPARATUS/PROCEDURE: Procedures identical to those in the compilation of this author's study of the AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.			SOURCE AND PURITY OF MATERIALS: Ethylene glycol was dried with CaO, and distilled in vacuum. Other details given in the compilation cited on the left.				

Silver Bromate					125		
COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]				Minamata H			
(2) 1,2-Ethanediol (et	thylene gly	col); $C_2H_6O_2$ ;		miyan			
[107-21-1]				Nippo	n Kagaku Zassh	i <u>1960</u> , <b>81</b> , 1801-5.	
(3) Water; H <sub>2</sub> O; [7732	2-18-5]						
VARIABLES:				PREPARED BY:			
Solvent composition $T/K = 203.15 = 208.1$	5 and 303	15		H Miumota			
1/10 - 255.15, 256.1	5 and 505	.15		11. 1411	yamoto		
EXPERIMENTAL DA	ATA:						
	HOCH2CH	<sup>2</sup> OH content	silv	er bror	nate solubility/n	nmol dm-3	
m	nass %	mol %ª	200	С	25ºC	30°C	
(	0.0	0.0	7.28	8	8.59	10.02	
•	7.347	2.250	6.50	)	7.76	9.19	
1	6.717	5.505	5.95	5	6.98	8.28	
2	8.934	10.568	5.28	3	6.16	7.25	
4	1.836	17.271	4.64	4	5.40	6.34	
5	0.188	22.627	4.20	)	4.96	5.85	
6	3.940	33.978	3.68	3	4.26	4.90	
7	4.386	45.738	3.25	5	3.76	4.25	
8:	5.049	62,280	2.76	5	3.29	3.61	
Calculated by the co	mpiler.						
			INI	CODM			
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:			
Excess AgBrO <sub>3</sub> and n	nixed solve	nt were placed into		AgBrO	3 prepared by ac	dition of dilute solu	itions of
glass-stoppered bottles. The bottles were rotated in a				AgNO <sub>3</sub> and KBrO <sub>3</sub> (Wako Co. guaranteed reagent) to a			
thermostat at a given temperature for 72 hours which			1	large volume of hot dilute KNO <sub>3</sub> solution. The			
was sufficient time to reach equilibrium. After the			s	solution was boiled, aged, and the precipitate washed			
solid was allowed to settle, aliquots of saturated			1	and dried under reduced presure. Ethylene glycol			
solution were withdrawn and the solubility was				(Wako, Co. guaranteed reagent) was dried over Na <sub>2</sub> SO <sub>4</sub> .			
determined by analysis for total silver.			E	and dis	tilled twice und	er reduced pressure.	
To each aliquot of sat	urated colu	ution, a measured	h	ESTIM	ATED ERROP.	<u></u>	
averse of 0.050 mol drys of NaCl solution, a measured				Solv probable error within ± 0.024 mmol dm-8			
excess of 0.000 mol dm <sup>-3</sup> of NaCl solution was added,				Temp: precision + 0.02 K			
and the remaining chloride titrated with 0.025 mol					U.UZ	420	
ance white a noise of	chiororiuo	cocon mulcator.					

**REFERENCES:** 

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COMPONENTS:			ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]			
			Miyamoto, H.; Nabata, K.
(2) 2-Methoxyethanol; $C_3H_8O_2$ ; [109-86-4]			
			Nippon Kagaku Zasshi <u>1970,</u> 91, 499-500.
(3) Water; H <sub>2</sub> O; [7732-18-5]			
VADIABIES.			DDEDADED DV.
Solvent composition			TREFARED DI:
T/K = 298.15 and 308.15			H. Miyamoto
			-
EXPERIMENTAL DATA:			
	$[C_3H_8O_2]$	[C <sub>3</sub> H <sub>8</sub> O	2] AgBrO <sub>3</sub> soly
t/ºC	mass %	mol %	mmol dm-3
25	0	0	8.59
	4.818	1.184	7.19
	10 192	2 616	6.27
	19.988	5.584	4.88
	29 872	9 161	3.88
	50 344	19 357	2.20
	70.009	25 601	2.25
	00.098	68 756	0.20
	100	100	0.20
	100	100	U
25	0	0	11.62
35	5 425	1 2 4 2	10.14
	5.435	1.342	10.14
	10.362	2.004	8.92
	20.045	5.603	7.06
	30.393	9.369	5.56
	50.449	19.422	3.03
	69.718	35.278	1.41
	89.693	67.322	0.23
	100	100	0
*Calculated by the compiler.			
	AUX	CILIARY IN	IFORMATION
METHOD/APPARATUS/PRO	OCEDURE:	;	SOURCE AND PURITY OF MATERIALS:
Excess AgBrOs and the mixed	l colvent were i	alacad into	AgBrOs prepared by addition of dilute solutions of
glass_stoppered bottles. The l	n solvent were j	ated in a	Agbrog prepared by addition of under solutions of $A_{ab}$
thermostat at a given tempera	ture for 72 hou	ateu in a	Aginog and KBIOg (wake, Co. guaranteed reagent) to a
allowing excess solid to sottle	aliqueta of set	urotod	was bailed and then aged. The precipitate was washed
andwing excess solid to settle,	anquots of sat	tol alluon	and dried under reduced pressure
by adding a manufactured average	analyzeu for to	al silver	and dried under reduced pressure.
by hadding a measured excess of	of INACT Solutio		2 Mathematicanal (Walks, Co. supremised reasont) was
by backtrating the excess chio	ride with AgN	O <sub>3</sub> using	2-Methoxyethanol (wako, Co. guaranteed reagent) was
dichlorofluorescein indicator.			dried over $Na_2CO_3$ and distilled two times.
			ESTIMATED ERROR:
			Soly: nothing specified.
			Temp: precision ± 0.02 K.
			REFERENCES:

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COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		ORIGINAL MEASUREMENTS:			
(2) 1-Propanol; C <sub>3</sub> H <sub>2</sub>	O; [71-23-8]	-	Owen, B. B. J. Am. Chem. Soc. <u>1933</u> , 55, 1922-8.		
(3) Water; H <sub>2</sub> O; [773	2-18-5]				
VARIABLES: Solvent composition T/K = 298		PREPARED BY:			
			H. Miyamoto and M. Salomon		
EXPERIMENTAL D	ATA:				
	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> O	H content	AgBrO <sub>3</sub> soly	density	
n	nass %	mol %ª	mmol dm-3	kg dm- <sup>3</sup>	
	0	0	8.12 <sup>b</sup>	0.9987	
	10	3.2	5.80	0.9821	
	20	7.0	4.36	0.9674	
	30	11.4	3.31	0.9472	
•	40	16.7	2.41	0.9261	
:	50	23.1	1.63	0.9051	
•Calculated by the co	ompiler.				
<sup>b</sup> Mean of 4 independ	lent determina	tions: average devi	ation reported as 0.00	04 mmol dm- <sup>3</sup> .	
		AUXILIARY	INFORMATION		
METHOD/APPARA'	TUS/PROCED	URE:	SOURCE AND P	URITY OF MATERIALS:	

AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.	for other details.
compilation of this author's study of the	then fractionated. See the compilation cited on the left
All procedures identical to those given in the	1-Propanol (Eastman) was dried with Na metal and
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Silver bromate: AgBrO <sub>3</sub> ; [7783-89-3]		
(2) 1-Propanol; $C_{3}H_{8}O$ ; [71-23-8]		Neuman, E. W.
(3) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Chem. Soc. <u>1934</u> , 56, 28-9.
VARIABLES:		PREPARED BY:
Solvent composition		
T/K = 298		H. Miyamoto
EXPERIMENTAL DATA:		
CH <sub>3</sub> CH <sub>2</sub> OH	content	AgBrO <sub>3</sub> solubility
mass %	mol %ª	mmol dm-3
0	0	8.131
3.67	1.13	7.14
11.27	3.67	5.62
15.16	5.08	4.99
19.13	6.62	4.49
23.17	8.29	4.05
31.49	12.11	3.21
40.13	16.73	2.43
49.13	22.45	1.70
63.28	34.06	0.86
•Calculated by the compiler.		
	AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDU	RE:	SOURCE AND PURITY OF MATERIALS:
All procedures identical to those give	en in the	Source and purity of 1-propanol not given. See the
compilation of this author's study of	the	compilation cited on the left for other details.
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) 1-Propanol; C <sub>3</sub> H <sub>8</sub> O; [71-23-8] (3) Water; H <sub>2</sub> O; [7732-18-5] VARIABLES: Solvent composition T/K = 293.15, 298.15 and 303.15		ORIGI Miyan Nippo PREPA H. M	INAL MEASURI moto, H. on Kagaku Zassh ARED BY: iyamoto	EMENTS: 1 <u>1958,</u> 79, 1314-8.	
EXPERIMENTAL DATA:					
CH <sub>3</sub> CH <sub>2</sub>	OH content	silver bro	mate solubility/r	nmol dm-3	
mass %	mol %ª	20ºC	25°C	30ºC	
0.0	0.0	7.28	8.59	10.02	
3.337	1.024	6.62	7.57	8.60	
6.911	2.177	5.80	6.71	7.48	
12.819	4.222	4.75	5.60	6.28	
17.680	6.049	4.20	4.96	5.47	
25.313	9.223	3.50	3.90	4.39	
30.685	11.716	3.09	3.35	3.84	
37.174	15.065	2.48	2.71	3.10	
46.754	20.838	1.87	2.07	2.23	
67.613	38.493	0.82	0.93	1.02	
73.777	45.752	0.66	0.75	0.84	
<sup>a</sup> Calculated by the compiler.					
	AUXILI	ARY INFORM	ATION		
METHOD/APPARATUS/PROCEDURE:			CE AND PURIT	Y OF MATERIALS:	
All procedures identical to those	e given in the	1-Prop	1-Propanol (Kanto Kagaku Co. guaranteed reagent)		eagent)
compilation of this author's study of the			refluxed over CaO, distilled twice from metallic Ca,		
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.			en distilled a thi	rd time.	

COMPONENTS: (1) Silver bromate; AgB (2) 2-Propanol; C <sub>3</sub> H <sub>8</sub> O; (3) Water; H <sub>2</sub> O; [7732-1	rO <sub>3</sub> ; [7783-89-3] [67-63-0] 8-5]		ORIGINAL MEASUREMENTS: Neuman, E. W. J. Am. Chem. Soc. <u>1934</u> , 56, 28-9.
VARIABLES: Solvent composition		····	PREPARED BY:
EVDEDIMENTAL DAT	A -	<u></u>	
EXPERIMENTAL DAT	A: [C <sub>3</sub> H <sub>8</sub> O] mass %	[C3H8O] mol %ª	AgBrO <sub>3</sub> soly mmol dm <sup>-3</sup>
	0	0	8.131
	3.64	1.12	7.00
	7.34	2.32	6.07
	11.12	3.61	5.29
	14.97	5.01	4.61
	18.90	6.53	4.06
	22.90	8.18	3.60
	26.99	9.98	3.18
	31.16	11.95	2.81
	39.77	16.52	2.10
	48.74	22.18	1.53
*Calculated by the comp	oiler.		
		AUXILIARY I	NFORMATION
METHOD/APPARATUS	S/PROCEDURE:	· · · · · · · · · · · · · · · · · · ·	SOURCE AND PURITY OF MATERIALS:
All procedures identical	to those given is	n the	The source of 2-propanol was not specified. See the
compilation of this author's study of the AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.			compilation cited on the left for other details.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) 2-Propanol; C <sub>3</sub> H <sub>8</sub> O; [67-63-0] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Miyamoto, H. Nippon Kagaku Zasshi <u>1959,</u> 80, 110-3.
VARIABLES: Solvent composition T/K = 293.15, 298.15 and 303.15	PREPARED BY: H. Miyamoto

2-propane	ol content	silver bromate solubility/mmol d		
mass %	mol %ª	20ºC	25ºC	30°C
0.0	0.0	7.28	8.59	10.02
3.072	0.941	6.57	7.58	8.67
6.361	1.996	5.82	6.74	7.84
11.946	3.908	4.83	5.53	6.30
17.931	6.147	3.98	4.52	5.00
23.856	8.586	3.39	3.85	4.31
29.241	11.023			3.51
29.458	11.126	2.99	3.27	
37.410	15.195	2.47	2.83	2.97
46.280	20.525	2.02	2.21	2.38
58.369	29.592	1.42	1.53	1.67
69.941	41.090	0.94	1.01	1.08

<sup>a</sup>Calculated by the compiler.

### AUXILIARY INFORMATION

#### METHOD/APPARATUS/PROCEDURE:

Excess AgBrO<sub>3</sub> and mixed solvent were placed into glass-stoppered bottles. The bottles were rotated in a thermostat at a given temperature for 72 hours which was sufficient time to reach equilibrium. After the solid was allowed to settle, aliquots of saturated solution were withdrawn and the solubility was determined by analysis for total silver.

To each aliquot of saturated solution, a measured excess of 0.050 mol dm<sup>-3</sup> of NaCl solution was added, and the remaining chloride titrated with 0.025 mol dm<sup>-3</sup> AgNO<sub>3</sub> using dichlorofluorescein indicator.

#### SOURCE AND PURITY OF MATERIALS:

AgBrO<sub>3</sub> prepared by addition of dilute solutions of AgNO<sub>3</sub> and KBrO<sub>3</sub> (Wako Co. guaranteed reagent) to a large volume of dilute KNO<sub>3</sub> solution. The solution was boiled, aged, and the precipitate washed and dried under reduced presure.

2-Propanol (Kanto Kagaku Co. guaranteed reagent) was dried over CaO and distilled twice.

#### **ESTIMATED ERROR:**

Soly: probable error within  $\pm$  0.07 mmol dm<sup>-3</sup>. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

COMPONENTS: (1) Silver bromate: AgBrO <sub>3</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS:
(2) Sodium nitrate; NaNO <sub>3</sub> ; [7631-99-4] (3) 2-Propanol: C <sub>9</sub> H <sub>2</sub> O: [67-63-0]	Gross, P.; Kuzmany, P.; Wald, M.
(4) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1937</u> , 59, 2692-4.
VARIABLES:	PREPARED BY:
Concentration of NaNO <sub>3</sub> T/K = 288.15	H. Miyamoto

Solubility of AgBrO<sub>3</sub> at 15.000°C in a 79.92 % 2-propanol and 20.08 % water mixture containing NaNO<sub>3</sub>. Nowhere in the paper do the authors define the bases of the % used to define the solvent composition. The density of the solvent was given as  $d_4^{15} = 0.8402$  g cm<sup>-3</sup>, and the static permittivity of the solvent was given as  $\epsilon = 25.4$ .

NaNO <sub>3</sub> concn	AgBrO <sub>3</sub> soly		
104mol dm-3	104mol dm-3	-log K <sub>s0</sub>	-log K <sup>0</sup> s0
0	1.326	7.755	7.842
1.335	1.385	7.717	7.841
2.627	1.435	7.686	7.838
5.156	1.513	7.646	7.840
7.588	1.576	7.605	7.833
9.932	1.627	7.577	7.833
12.29	1.682	7.548	7.829
14.37	1.732	7.523	7.825
17.64	1.762	7.508	7.839
22.53	1.810	7.485	7.856

Solubility product calculated from  $K_{s0} = [AgBrO_3]^2$ . The thermodynamic solubility product was calculated from

$$log K_{e0}^0 = log K_{e0} - 3.76(I)^{1/2}$$

where I is the ionic strength.

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The solvent composition is 79.92 % 2-propanol and 20.08 % water (% not defined, but probably was mass %). The mixed solvent with NaNO <sub>3</sub> and solid AgBrO <sub>3</sub> were placed in glass flasks. The flasks were rotated in a thermostat at 15.000°C for 12 hours which was stated to be sufficient time to insure equilibrium. For the analysis, 25 cm <sup>3</sup> of filtered saturated solution was placed in a small flask and evaporated on a boiling water bath while N <sub>2</sub> was forced through the liquid. The precipitated AgBrO <sub>3</sub> was titrated iodometrically.	AgBrO <sub>3</sub> prepared by adding AgNO <sub>3</sub> to a solution of KBrO <sub>3</sub> . Both AgNO <sub>3</sub> and KBrO <sub>3</sub> were AR grade materials and recrystallized twice. NaNO <sub>3</sub> was the "purest commercial product," and was recrystallized from ethanol. C.p. grade 2-propanol was distilled from sulfanilic acid in a stream of N <sub>2</sub> .	
	ESTIMATED ERROR: Soly: precision probably ≤ 1 % (compiler). Temp: precision ± 0.0025 K.	
	REFERENCES:	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	Gross, P.; Kuzmany, P.; Wald, M.
(3) 2-Propanol; C <sub>3</sub> H <sub>8</sub> O; [67-63-0]	
(4) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1937</u> , 59, 2692-4.
VARIABLES:	PREPARED BY:
Concentration of AgNO <sub>3</sub>	
1/K = 288.15	H. Miyamoto

Solubility of AgBrO<sub>3</sub> at 15.000°C in a 79.38 % 2-propanol and 20.62 % water mixture containing NaNO<sub>3</sub>. Nowhere in the paper do the authors define the bases of the % used to define the solvent composition. The density of the solvent was given as  $d_4^{15} = 0.8415$  g cm<sup>-3</sup>, and the static permittivity of the solvent was given as  $\epsilon = 25.6$ .

AgBrO <sub>3</sub> soly		
104mol dm-3	-log K <sub>s0</sub>	-log K0,0
1.532	7.630	7.723
1.136	7.614	7.725
0.883	7.598	7.725
0.725	7.579	7.723
0.611	7.568	7.726
0.541	7.546	7.722
0.484	7.535	7.720
0.406	7.514	7.721
0.353	7.498	7.723
	AgBrO <sub>3</sub> soly 10 <sup>4</sup> mol dm <sup>-3</sup> 1.532 1.136 0.883 0.725 0.611 0.541 0.484 0.406 0.353	AgBrO3 soly         104mol dm-3       -log K <sub>s0</sub> 1.532       7.630         1.136       7.614         0.883       7.598         0.725       7.579         0.611       7.568         0.541       7.535         0.484       7.535         0.406       7.514         0.353       7.498

Solubility product calculated from  $K_{s0} = [AgBrO_3]^2$ . The thermodynamic solubility product was calculated from

where I is the ionic strength.

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The solvent composition is 79.38 % 2-propanol and 20.62 % water (% not defined, but probably was mass %). The mixed solvent with AgNO <sub>3</sub> and solid AgBrO <sub>3</sub> were placed in glass flasks. The flasks were rotated in a thermostat at 15.000°C for 12 hours which was stated to be sufficient time to insure equilibrium. For the analysis, 25 cm <sup>3</sup> of filtered saturated solution was placed in a small flask and evaporated on a boiling water bath while N <sub>2</sub> was forced through the liquid. The precipitated AgBrO <sub>3</sub> was titrated iodometrically.	AgBrO <sub>3</sub> prepared by adding AgNO <sub>3</sub> to a solution of KBrO <sub>3</sub> . Both AgNO <sub>3</sub> and KBrO <sub>3</sub> were AR grade materials and recrystallized twice. C.p. grade 2-propanol was distilled from sulfanilic acid in a stream of $N_2$ .		
	ESTIMATED ERROR: Soly: precision probably $\leq 1$ % (compiler). Temp: precision ± 0.0025 K.		
	REFERENCES:		

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Sodium benzene sulfonate; C <sub>6</sub> H <sub>5</sub> O <sub>3</sub> SNa; [515-42-4] (3) 2-Propanol; C <sub>3</sub> H <sub>8</sub> O; [67-63-0] (4) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Gross, P.; Kuzmany, P.; Wald, M. J. Am. Chem. Soc. <u>1937</u> , 59, 2692-4.
VARIABLES: Concentration of $C_6H_5O_3SNa$ T/K = 288.15	PREPARED BY: H. Miyamoto

Solubility of AgBrO<sub>3</sub> at 15.000°C in a 79.04 % 2-propanol and 20.96 % water mixture containing NaNO<sub>3</sub>. Nowhere in the paper do the authors define the bases of the % used to define the solvent composition. The density of the solvent was given as  $d_4^{15} = 0.8423$  g cm<sup>-3</sup>, and the static permittivity of the solvent was given as  $\epsilon = 25.75$ .

C <sub>6</sub> H <sub>5</sub> O <sub>3</sub> SNa concn	AgBrO <sub>3</sub> soly		
104mol dm-8	104mol dm-3	-log K <sub>s0</sub>	-log K <sup>0</sup> s0
0	1.788	7.495	7.600
1.009	1.482	7.469	7.596
1.981	1.889	7.447	7.595
3.816	1.963	7.414	7.595
4.728	1.980	7.406	7.601
5.564	2.003	7.396	7.603
6.786	2.025	7.387	7.610
8.675	2.045	7.379	7.625

Solubility product calculated from  $K_{s0} = [AgBrO_3]^2$ . The thermodynamic solubility product was calculated from

 $log K_{s0}^0 = log K_{s0} - 3.76(I)^{1/2}$ 

where I is the ionic strength.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The solvent composition is 79.04 % 2-propanol and 20.96 % water (% not defined, but probably was mass %). The mixed solvent with $C_6H_5O_3SNa$ and solid AgBrO <sub>3</sub> were placed in glass flasks. The flasks were rotated in a thermostat at 15.000°C for 12 hours which was stated to be sufficient time to insure equilibrium. For the analysis, 25 cm <sup>3</sup> of filtered saturated solution was placed in a small flask and evaporated on a boiling water bath while N <sub>2</sub> was forced through the liquid. The precipitated AgBrO <sub>3</sub> was titrated iodometrically.	AgBrO <sub>3</sub> prepared by adding AgNO <sub>3</sub> to a solution of KBrO <sub>3</sub> . Both AgNO <sub>3</sub> and KBrO <sub>3</sub> were AR grade materials and recrystallized twice. Sodium benzene sulfonate was made from a concentrated solution of NaOH (AR grade, Merck) and benzene sulfonic acid (Kahlbaum). The product was recystallized from ethanol. C.p. grade 2-propanol was distilled from sulfanilic acid in a stream of N <sub>2</sub> .			
	ESTIMATED ERROR: Soly: precision probably $\leq 1$ % (compiler). Temp: precision ± 0.0025 K.			
	REFERENCES:			

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS:
<ul> <li>(2) Potassium nitrate; KNO<sub>3</sub>; [7757-79-1]</li> <li>(3) 2-Propene-1-ol (allyl alcohol); C<sub>3</sub>H<sub>6</sub>O; [107-18-6]</li> </ul>	Keefer, R. M.; Andrews, L. J.; Kepner, R.E.
(4) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.
VARIABLES: Concentration of H <sub>2</sub> CCHCH <sub>2</sub> OH T/K = 298	PREPARED BY: H. Miyamoto

The initial solvent was water with small amounts of H2CCHCH2OH, and 0.10 mol dm-3 KNO3.

H <sub>2</sub> CCHCH <sub>2</sub> OH concn	AgBrO <sub>3</sub> soly	K1	
mol dm- <sup>3</sup>	102mol dm-3	mol-1 dm <sup>3</sup>	
0.585	. 2.98	14.0	
0.293	2.20	14.0	
0.146	1.69	13.8	
0.0732	1.38	13.6	

The authors reported  $K_{s0} = 1.00 \times 10^{-4} \text{ mol}^2 \text{ dm}^{-6}$  in 0.10 mol dm<sup>-3</sup> KNO<sub>3</sub> solution. Values of  $K_1$  in the above table are defined by:

$$K_{1} = \frac{\left[Ag(C_{3}H_{6}O)^{*}\right]}{\left[Ag^{*}\right]\left[C_{3}H_{6}O\right]}$$

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
KNO <sub>3</sub> was added to the solvent to adjust the ionic strength at 0.10 mol dm <sup>-3</sup> . These solutions were then added to AgBrO <sub>3</sub> crystals in glass-stoppered erlenmeyer flasks. The flasks were aggitated for 4 hours at $25^{\circ}$ C. After allowing excess solid to settle, aliquots of saturated solution were withdrawn and analyzed for silver by adding a measured excess of NaCl solution, and backtitrating the excess chloride with AgNO <sub>3</sub> using dichlorofluorescein as an indicator.	AgBrO <sub>3</sub> was prepared by slowly adding a dilute solution of KBrO <sub>3</sub> to a dilute solution of AgNO <sub>3</sub> . The precipitate was washed, filtered, suspended in water for several days, and dried at 110°C. The precipitate was analyzed for silver: found 45.90 % (calculated 45.75 %). The source and purity of allyl alcohol was not given.		
	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES:		

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COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]			
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Keefer, R. M.; Andrews, L. J.; Kepner, R.E.		
(3) 2-Methyl-2-propene-1-ol ( $\beta$ -methallyl alcohol); C-H <sub>2</sub> O: $[513-42-8]$	J Am Chem Soc 1949 71 3906-9		
(4) Water: $H_{2}O$ ; [7732-18-5]	5. Am. Chem. Soc. <u>1942</u> , 71, 5700-7.		
VARIABLES:	PREPARED BY:		
Concentration of $H_2CC(CH_3)CH_2OH$	H. Miusmata		
1/K = 298	n. Miyamoto		
EXPERIMENTAL DATA:			
The initial solvent was water with small amounts of $H_2C$	C(CH <sub>3</sub> )CH <sub>2</sub> OH, and 0.10 mol dm <sup>-3</sup> KNO <sub>3</sub> .		
	A-R-O salu V		
$H_2CC(CH_3)CH_2OH$ conch A mol dm-3	$\begin{array}{ccc} \text{AgBrO}_3 \text{ soly} & \text{K}_1 \\ 02 \text{mol} \ \text{dm}^3 & \text{mol}^{-1} \ \text{dm}^3 \end{array}$		
mor un -			
0.470	2.42 10.8		
0.235	1.84 10.8		
0.118	1.48 10.8		
0.059	1.27 11.2		
table are defined by: $K_{1} = \frac{\left[Ag(C_{4}H_{8}O)^{*}\right]}{\left[Ag^{*}\right]\left[C_{4}H_{8}O\right]}$			
AUXILIARY IN	FORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
KNO <sub>3</sub> was added to the solvent to adjust the ionic strength at 0.10 mol dm <sup>-3</sup> . These solutions were then added to AgBrO <sub>3</sub> crystals in glass-stoppered erlenmeyer flasks. The flasks were aggitated for 4 hours at $25^{\circ}$ C. After allowing excess solid to settle, aliquots of saturated solution were withdrawn and analyzed for silver by adding a measured excess of NaCl solution, and backtitrating the excess chloride with AgNO <sub>3</sub> using dichlorofluorescein as an indicator.	AgBrO <sub>3</sub> was prepared by slowly adding a dilute solution of KBrO <sub>3</sub> to a dilute solution of AgNO <sub>3</sub> . The precipitate was washed, filtered, suspended in water for several days, and dried at 110°C. The precipitate was analyzed for silver: found 45.90 % (calculated 45.75 %). $\beta$ -Methallyl alcohol (Shell Chem. Corp.) was dried and fractionated before use.		
	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES:		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
	Miyamoto, H.
(2) 1,2,3-Propanetriol (glycerol); C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> ; [56-81-5]	
	Nippon Kagaku Zasshi <u>1959,</u> 80, 825-8.
(3) Water; $H_2O$ ; [7732-18-5]	
VARIABLES	PREPARED BY:
Solvent composition $T/K = 288.15, 293.15, 298.15$ and 303.15	H. Miyamoto
Solvent composition T/K = 288.15, 293.15, 298.15 and 303.15	H. Miyamoto
Solvent composition T/K = 288.15, 293.15, 298.15 and 303.15 EXPERIMENTAL DATA:	H. Miyamoto
Solvent composition T/K = 288.15, 293.15, 298.15 and 303.15 EXPERIMENTAL DATA: glycerol content	H. Miyamoto

Bijecioi content		311 4				
	mass %	mol %ª	15ºC	20°C	25°C	30ºC
	0.0	0.0	6.07	7.28	8.59	10.02
	8.348	1.751	5.86	7.02	8.30	9.82
	16.180	3.639	5.72	6.96	8.03	9.58
	30.909	8.047	5.54	6.44	7.82	8.98
	40.628	11.806	5.24	6.28	7.44	8.60
	58.346	21.507	4.81	5.57	6.59	7.55
	66.989	28.416			6.19	7.00
	79.633	43.338	3.89	4.67	5.40	6.18
	90.713	65.644		3.46	4.29	5.09

"Calculated by the compiler.

#### AUXILIARY INFORMATION

#### METHOD/APPARATUS/PROCEDURE:

Excess  $AgBrO_3$  and mixed solvent were placed into glass-stoppered bottles. The bottles were rotated in a thermostat at a given temperature for 72 hours which was sufficient time to reach equilibrium. After the solid was allowed to settle, aliquots of saturated solution were withdrawn and the solubility was determined by analysis for total silver.

To each aliquot of saturated solution, a measured excess of 0.050 mol dm<sup>-3</sup> of NaCl solution was added, and the remaining chloride titrated with 0.025 mol dm<sup>-3</sup> AgNO<sub>3</sub> using dichlorofluorescein indicator.

# SOURCE AND PURITY OF MATERIALS:

AgBrO<sub>3</sub> prepared by addition of dilute solutions of AgNO<sub>3</sub> and KBrO<sub>3</sub> (Wako Co. guaranteed reagent) to a large volume of dilute KNO<sub>3</sub> solution. The solution was boiled, aged, and the precipitate washed and dried under reduced presure.

Glycerol (Kanto Kagaku Co. guaranteed reagent) was distilled twice under reduced pressure.

### ESTIMATED ERROR:

Soly: probable error within  $\pm$  0.03 mmol dm<sup>-3</sup>. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

COMPONENT	S:		ORIGINAL M	EASUREMENTS:
(1) Silver brom	nate; AgBrO <sub>3</sub> ; [7783-89	9-3]		
(2) 1,2,3-Propanetriol (glycerol); C <sub>3</sub> H <sub>8</sub> O <sub>3</sub> ; [56-81-5]			Owen, B B.	
(3) Water; $H_2C$	); [7732-18-5]		J. Am. Chem	. Soc. <u>1933,</u> 55, 1922-8.
VARIABLES		<u></u>	PREPARED R	v.
Solvent compo	sition		I KELAKED D	1.
T/K = 298			H. Miyamoto	and M. Salomon
EXPERIMENT	TAL DATA:			
	glycerol content	Ag	BrO3 soly	density
	mass %	mol %* m	nmol dm-3	kg dm-3
	0	0	8.12 <sup>b</sup>	0.9987
	10	2.1	7.80	1.0207
	20	4.7	7.49	1.0453
	30	7.7	7.15	1.0706
	40	11.5	6.84	1.0971
	50	16.4	6.48	1.1239
	60	22.7	6.08	1.1511
	70	31.3	5.59	1.1784
	80	43.9	4.94	1.2054
<sup>a</sup> Calculated by	the compiler.			
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Procedures identical to those in the compilation of this		Baker's analyzed glycerol dist in vac. For glycerol		
author's study of the AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.			content > 30 %, Kahlbaum's "purest" glycerol was used.	

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]					
(2) Sodium hydroxide	; NaOH; [1310-73-2 0.: [64-19-7]	]	Davie	es, P. B.; Monk, C. B.	
(4) 1.2.3-Propanetriol	(glycerol): C <sub>2</sub> H <sub>2</sub> O <sub>2</sub> :	[56-81-5]	J. Cł	em. Soc. 1951. 2718-23.	
(5) Water; H <sub>2</sub> O; [7732	-18-5]	[		<u></u> ,	
VARIABLES:			PREPARED BY:		
Concentrations of Nat T/K = 298.15	OH, CH <sub>3</sub> COOH and	glycerol	н. м	iyamoto	
EXPERIMENTAL DATA:					
glycerol	glycerol NaOH c		oncn	CH <sub>3</sub> COOH concn	AgBrO <sub>3</sub> soly
mass %	mol %ª	mol dn	1-3	mol dm-3	mmol dm-3
31.7	8.3 <sub>2</sub>	0.0		0.0	7.09
		0.0309	6	0.03437	8.33
		0.0516	0	0.05776	8.90
42.3	12.54	0		0	6.75
		0.0292	.7	0.03381	8.01
	0.0516		0	0.05776	8.60
•Calculated by the compiler.					
	A	UXILIARY IN	FORM	ATION	
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
Procedures identical to those in the compilation of			"Laboratory grade" glycerol was used. Other details		
these authors' study of the			given in the compilation cited on the left.		
AgBrO <sub>3</sub> -NaOH-CH <sub>3</sub> COOH-CH <sub>3</sub> CH <sub>2</sub> OH-H <sub>2</sub> O system.					

COMPONENTS:		ORIGI	NAL MEASURI	EMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]						
(-,,0,,		Miyan	noto, H.			
(2) 2-Methyl	-2-propanol (t-but	anol); C4H10O;				
[75-65-0]			Nippo	n Kagaku Zassh	ii <u>1957</u> , 78, 1392-6.	
(3) Water; H <sub>2</sub>	O; [7732-18-5]					
VARIABLES	:		PREPA	RED BY:		
Solvent comp	osition					
T/K = 293.13	5, 298.15 and 303	5.15	H. Mi	yamoto		
EXPERIMEN	TAL DATA:	58° 4 V	I		<u></u>	
	t-butano	l content	silver bror	nate solubility/r	nmol dm-3	
	mass %	mol %ª	20ºC	25ºC	30°C	
	0.0	0.0	7.28	8.59	10.02	
	2.781	0.690	6.55	7.71	9.08	
	4.882	1.232	6.02	7.13	8.43	
	10.555	2.788	4.58	6.04	7.13	
	15.943	4.407	3.94	4.80	5.86	
	20.539	5.911	3.49	4.35	5.21	
	25.336	7.619	3.11	3.73	4.57	
	30.860	9.786	2.58	3.03	3.73	
	38.712	13.309	2.10	2.41	2.91	
	48.447	18.593	1.56	1.74	2.06	
	58.542	25.551	1.14	1.31	1.48	
Calaviata da h	u the committee					
"Calculated D	y the complier.					

#### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Excess  $AgBrO_8$  and mixed solvent were placed into glass-stoppered bottles. The bottles were rotated in a thermostat at a given temperature for 72 hours which was sufficient time to reach equilibrium. After the solid was allowed to settle, aliquots of saturated solution were withdrawn and the solubility was determined by analysis for total silver.

To each aliquot of saturated solution, a measured excess of 0.050 mol dm<sup>-3</sup> of NaCl solution was added, and the remaining chloride titrated with 0.025 mol dm<sup>-3</sup> AgNO<sub>3</sub> using dichlorofluorescein indicator.

#### SOURCE AND PURITY OF MATERIALS:

AgBrO<sub>3</sub> prepared by addition of dilute solutions of AgNO<sub>3</sub> and KBrO<sub>3</sub> (Wako Co. guaranteed reagent) to a large volume of dilute KNO<sub>3</sub> solution. The solution was boiled, aged, and the precipitate washed and dried under reduced presure.

t-Butanol (Kanto Kagaku Co. guaranteed reagent) was recrystallized and distilled from metallic sodium.

### **ESTIMATED ERROR:**

Soly: probable error within  $\pm$  0.03 mmol dm<sup>-3</sup>. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

r				
COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]				
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Keefer, R. M.; Andrews, L. J.; Kepner, R.E.			
(3) 2-Butene-1-ol (crotyl alcohol); $C_4H_8O$ ; [6117-91-5]	J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.			
(4) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
Concentration of CH <sub>3</sub> CH=CHCH <sub>2</sub> OH				
T/K = 298	H. Miyamoto			
EXPERIMENTAL DATA:				
The initial solvent was water with small amounts of crot	yl alcohol, and 0.10 mol dm <sup>-3</sup> KNO <sub>3</sub> .			
CH <sub>3</sub> CH=CHCH <sub>2</sub> OH concn	AgBrO <sub>3</sub> soly K <sub>1</sub>			
mol dm <sup>-3</sup>	l0 <sup>2</sup> mol dm <sup>-3</sup> mol <sup>-1</sup> dm <sup>3</sup>			
0.702	1.87 3.6			
0.527	1.73 3.9			
0.351	1.54 4.0			
0.176	1.30 4.0			
0.0878	1.16 4.1			
The authors reported $K_{a0} = 1.00 \times 10^{-4} \text{ mol}^2 \text{ dm}^{-6} \text{ in } 0.1$	0 mol dm <sup>-3</sup> KNO <sub>3</sub> solution. Values of $K_1$ in the above			
table are defined by:				
$K_1 = [Ag(C_4H_8O)^+]/[Ag^+][C_4H_8O]$				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Complete details given in the compilation of these	Crotyl alcohol was prepd from 2-butenal (crotonalde-			
authors' study of the AgBrO <sub>3</sub> -KNO <sub>3</sub> -C <sub>3</sub> H <sub>6</sub> O-H <sub>2</sub> O sys-	hyde). Remaining details given in the compilation			
tem.	cited on the left.			

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]				
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Keefer, R. M.; Andrews, L. J.; Kepner, R.E.			
(3) 3-Butene-2-ol (methyl vinyl carbinol); C <sub>4</sub> H <sub>8</sub> O;	J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.			
[598-32-3]				
(4) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
Concentration of CH <sub>3</sub> CH(OH)CH=CH <sub>2</sub>				
T/K = 298	H. Miyamoto			
EXPERIMENTAL DATA:				
The initial solvent was water with small amounts of CH	$_{3}$ CH(OH)CH=CH <sub>2</sub> , and 0.10 mol dm <sup>-3</sup> KNO <sub>3</sub> .			
CH <sub>3</sub> CH(OH)CH=CH <sub>2</sub> concn	AgBrO <sub>3</sub> soly K <sub>1</sub>			
mol dm <sup>-3</sup>	0 <sup>2</sup> mol dm <sup>-3</sup> mol <sup>-1</sup> dm <sup>3</sup>			
0.255	2.12 14.7			
0.204	1.93 14.3			
0.102	1.53 14.5			
0.051	1.28 14.9			
0.025	1.14 14.9			
The authors reported $K_{s0} = 1.00 \times 10^{-4} \text{ mol}^2 \text{ dm}^{-6}$ in 0.1	0 mol dm <sup>-3</sup> KNO <sub>3</sub> solution. Values of $K_1$ in the above			
table are defined by:				
$K_1 = [Ag(C_4H_8O)^+]/[Ag^+][C_4H_8O]$				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Complete details given in the compilation of these	CH <sub>3</sub> CHOHCH=CH <sub>2</sub> prepd by hydrolysis of butenyl			
authors' study of the AgBrO3-KNO3-C3H6O-H2O sys-	chloride. Remaining details given in the compilation			
tem.	cited on the left.			

tem.

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]				
(2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Keefer, R. M.; And	drews, L. J.; Kepner, R.E.		
(3) 2-Methyl-2-butene-1-ol; $C_5H_{10}O$ ; [4675-87-0]	J. Am. Chem. Soc.	<u>1949,</u> 71, 3906-9.		
(4) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:	PREPARED BY:		
Concentration of CH <sub>3</sub> CH=C(CH <sub>3</sub> )CH <sub>2</sub> OH				
T/K = 298	H. Miyamoto			
EXPERIMENTAL DATA:				
The initial solvent was water with small amounts of CH	3CH=C(CH3)CH2OH,	and 0.10 mol dm <sup>-3</sup> KNO <sub>3</sub> .		
CH <sub>3</sub> CH=C(CH <sub>3</sub> )CH <sub>2</sub> OH concn	AgBrO3 soly	K <sub>1</sub>		
mol dm-3	10 <sup>2</sup> mol dm- <sup>3</sup> n	nol-1 dm <sup>3</sup>		
0.100	1.21	4.8		
0.050	1.12	4.9		
0.020	1.05	5.5		
The authors reported $K_{-0} = 1.00 \times 10^{-4} \text{ mol}^2 \text{ dm}^{-6}$ in 0.	10 mol dm-8 KNO. so	lution Values of K, in the above		
table are defined by:	10 mor um 121.03 50			
$K_1 = [Ag(C_cH_{10}O)+1/[A$	8+11C+H1001			
1 [0(-0.100 * 1/[0 1[-0.100]				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PUR	ITY OF MATERIALS:		
Complete details given the compilation of these	CH <sub>3</sub> CH=C(CH <sub>3</sub> )CH <sub>2</sub> OH was supplied by Prof. W.G.			
authors' study of the AgBrO3-KNO3-C3H6O-H2O	Young of the UCLA. Remaining details given in the			
system.	compilation cited on the left.			
4 <sup>-</sup>				

ORIGINAL ME	ORIGINAL MEASUREMENTS:		
Keefer, R. M.	Keefer, R. M.; Andrews, L. J.; Kepner, R.E. J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.		
J. Am. Chem.			
PREPARED BY	<i>ί</i> :		
H. Miyamoto			
C₂H₅CH(OH)CH=CI	$H_2$ , and 0.10 mol dm <sup>-3</sup> KNO <sub>3</sub> .		
AgBrO <sub>3</sub> soly	K1		
10 <sup>2</sup> mol dm-3	mol-1 dm <sup>3</sup>		
2.68	13.8		
2.04	14.2		
1.52	15.3		
1.28	15.2		
0.10 mol dm-3 KN	$O_3$ solution. Values of $K_1$ in the above		
[Ag+][C₅H <sub>10</sub> O]			
INFORMATION			
SOURCE AND	PURITY OF MATERIALS:		
C₂H₅CH(OH)CI	$C_2H_5CH(OH)CH=CH_2$ prepd from ethylmagnesium		
bromide and acrolein (2-propenal). Remaining details			
given in the con	given in the compilation cited on the left.		
	ORIGINAL MH Keefer, R. M. J. Am. Chem. PREPARED BY H. Miyamoto C <sub>2</sub> H <sub>5</sub> CH(OH)CH=Cl AgBrO <sub>3</sub> soly 10 <sup>2</sup> mol dm <sup>-3</sup> 2.68 2.04 1.52 1.28 0.10 mol dm <sup>-3</sup> KN [Ag+][C <sub>5</sub> H <sub>10</sub> O] INFORMATION SOURCE AND C <sub>2</sub> H <sub>5</sub> CH(OH)Cl bromide and ac given in the co		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7/83-89-3] (2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	Keefer, R. M.; Andrews, L. J.; Kepner, R.E.
(3) Phenol; C <sub>6</sub> H <sub>6</sub> O; [108-95-2]	
(4) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1949</u> , 71, 3906-9.
VARIABLES:	PREPARED BY:
Concentration of $C_6H_5OH$ T/K = 298	H. Miyamoto

The initial solvent was water with small amounts of  $C_6H_5OH$ , and 0.10 mol dm<sup>-3</sup> KNO<sub>3</sub>.

C <sub>6</sub> H <sub>5</sub> OH concn	AgBrO <sub>3</sub> soly	К1
mol dm <sup>-3</sup>	10 <sup>2</sup> mol dm- <sup>3</sup>	mol-1 dm <sup>3</sup>
0.448	1.28	1.54
0.224	1.14	1.48
0.112	1.07	1.59
0	0.989	

The authors reported  $K_{s0} = 9.78 \times 10^{-5} \text{ mol}^2 \text{ dm}^{-6}$  in 0.10 mol dm<sup>-3</sup> KNO<sub>3</sub> solution. Values of K<sub>1</sub> in the above table are defined by:

K 1 =	$\left[ Ag(C) \right]$	°₅H₅O)*]
	$[Ag^{\dagger}]$	$[C_{\delta}H_{\delta}O]$

# AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
KNO <sub>3</sub> was added to the solvent to adjust the ionic strength at 0.10 mol dm <sup>-3</sup> . These solutions were then added to AgBrO <sub>3</sub> crystals in glass-stoppered erlenmeyer flasks. The flasks were aggitated for 4 hours at 25°C. After allowing excess solid to settle, aliquots of saturated solution were withdrawn and analyzed for silver by adding a measured excess of NaBr solution, and weighing the precipitated AgBr.	AgBrO <sub>3</sub> was prepared by slowly adding a dilute solution of KBrO <sub>3</sub> to a dilute solution of AgNO <sub>3</sub> . The precipitate was washed, filtered, suspended in water for several days, and dried at 110°C. The precipitate was analyzed for silver: found 45.90 % (calculated 45.75 %). The source and purity of KNO <sub>3</sub> was not given. J.T. Baker c.p. grade phenol was distilled. ESTIMATED ERROR: Nothing specified.			
	REFERENCES:			

COMPONENTS: (1) Silver bromate; AgBrO <sub>5</sub> ; [7783-89-3]	ORIGINAL MEASUREMENTS:
(2) Mannitol; C <sub>6</sub> H <sub>14</sub> O <sub>6</sub> ; [87-78-5]	J. Am. Chem. Soc. <u>1933</u> , 55, 1922-8.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Solvent composition T/K = 298	PREPARED BY: H. Miyamoto and M. Salomon
EXPERIMENTAL DATA:	

mannitol content		AgBrO <sub>3</sub> soly	density
mass %	mol %a	mmol dm-3	kg dm-8
0	0	8.12 <sup>b</sup>	0.9987
5	0.5	8.24	1.0147
10	1.1	8.38	1.0328
15	1.7	8.51	1.0513

•Calculated by the compiler.

<sup>b</sup>Mean of four independent measurements with an average deviation of 0.004 mmol dm<sup>-3</sup>.

	······································
AUXILIARY IN	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Three to four grams of $AgBrO_3$ crystals were placed in long-necked 200 to 500 cm <sup>3</sup> flasks. Ice-cold solvent was quickly introduced into the flasks without wetting the necks, and the flasks were sealed. The flasks were rotated slowly for five or six days at 25°C. Prelimi- nary studies indicated that equilibrium was reached within two days. After 2-3 days, the solutions became turbid.	AgBrO <sub>3</sub> was prepared from dilute solutions of Baker's "Analyzed" grade AgNO <sub>3</sub> and KBrO <sub>3</sub> . Equivalent volumes of these two solutions were slowly mixed, and the resulting precipitate was washed and recrystallized. Mannitol (Th. Schuchardt, Gorlitz, Germany) was rcrystallized four times from conductivity water, and then dried in vacuum (1).
The saturated solutions were forced through asbestos- glass wool filtering mats, and 100 to 400 g samples were weighed. The Ag content was determined gravimetrically as AgBr.	ESTIMATED ERROR: Soly: av deviation given above. Precision of all results not specified. Temp: nothing specified.
For the mixed solvents, the solubilities were deter- mined on a mass basis and converted to mol dm <sup>-3</sup> units using the density values given in the table.	REFERENCES: 1. Akerlof, G. J. Am. Chem. Soc. <u>1932</u> , 54, 4125.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ;	[7783-89-3]		Kojzumi E. Miyamoto H		
(2) Sucrose; C <sub>12</sub> H <sub>22</sub> O <sub>11</sub> ; [57-	50-1]				
			Nippon Kagaku Zasshi <u>1956,</u> 77, 193-6.		
(3) water; $H_2O$ ; [7732-18-5]					
VARIABLES:	Web-1001		PREPARED BY:		
Concentration of sucrose	02.15		II Minerata		
1/K = 295.15, 296.15 and 5	03.15		H. Miyamoto		
EXPERIMENTAL DATA:					
	$[C_{12}H_{22}O_{11}]$	$[C_{12}H_{22}C_{12}]$	O <sub>11</sub> ] AgBrO <sub>3</sub> soly		
t/ºC	mass %	mol %	a mmol dm-3		
20	0	0	7.28		
20	5.379	0.298	7.18		
	9.951	0.578	7.00		
	17.142	1.077	6.83		
	35.197	1.742	6.61		
	34.793	2.732	6.39		
	46.975	4.455	5.62		
25	0	0	P 50		
25	5 047	0 279	8.43		
	10.234	0.596	8.32		
	17.347	1.093	8.05		
	25.221	1.744	7.87		
	35.413	2.805	7.63		
	46.654	4.400	6.84		
20	0	0	10.02		
50	5 047	0 279	9.94		
	9 951	0.275	9.86		
	16 959	1 063	9.55		
	25.194	1.742	9.39		
	35.258	2.786	9.20		
	47.389	4.526	8.44		
<sup>a</sup> Calculated by the compiler.					
	AUX	CILIARY IN	NFORMATION		
METHOD/APPARATUS/PF	ROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
Excess AgBrO <sub>3</sub> and the mixe	ed solvent were p	placed into	AgBrO <sub>3</sub> prepared by addition of dilute solutions of		
glass-stoppered bottles. The	bottles were rot	ated in a	AgNO <sub>3</sub> and KBrO <sub>3</sub> (Wako, Co. guaranteed reagent) to a		
thermostat at a given temper	rature for 72 hou	rs. After	large volume of hot water. The precipitate was		
allowing excess solid to settle	e, aliquots of sat	urated	washed, and dried under reduced pressure.		
solution were withdrawn and analyzed for total silver					
by adding a measured excess	s of NaCl solution	n followed	Sucrose (Kanto Kagaku Co. guaranteed reagent) was		
by backtrating the excess ch	loride with 0.025	mol dm-3	used as received.		
AgNO <sub>3</sub> using dichlorofluores	scein indicator.				
			ESTIMATED ERROR:		
			Soly: precision within $\pm$ 0.05 mmol dm <sup>-3</sup> (compiler).		
			Temp: precision $\pm$ 0.02 K.		
		i	REFERENCES:		

COMPONENTS	7.			ODICI	AT MEACTIN	MENTS			
(1) Silver har	5; atal A. a D. a C. i 177	02 00 21		Winmate H					
(1) Sliver brom	ate; $AgBrO_3$ ; [//	03-09-3]		Miyan	Miryamoto, A.				
(2) 2-Propanon	e (acetone); Cgri	<sub>6</sub> 0; [07-04-1]		ruppon Kagaku Zassni <u>1957</u> , 78, 090-4.					
(5) water, H <sub>2</sub> O,	, [7752-18-5]								
VARIABLES:			PREPA	RED BY:					
Solvent composition $T/K = 293.15$ , 298.15 and 303.15			H. Mi	vamoto					
EXPERIMENT	AL DATA:								
	CH <sub>s</sub> C(O)CH	I. content	sil	ver bron	nate solubility/r	nmol dm <sup>-3</sup>			
	mass %	mol %ª	20	°C	25°C	30°C			
	0.0	0.0	7.:	28	8.59	10.02			
[	3.943	1.257	6.	57	7.71	9.26			
	7,977	2.618	5.	84	6.88	8.19			
	16.532	5.788	4.4	45	5.28	6.32			
	22.332	8.188	3.0	58	4.33	5.41			
	30.164	11.815	2.9	96	3.57	4.20			
	36.898	15.353	2.4	42	2.79	3.49			
	44.062	19.635	1.9	90	2.19	2.60			
	54.697	27.246	1.3	29	1.48	1.93			
	68.787	40.603	0.1	79	0.96	1.13			
	80.470	56.103	0.:	51	0.65	0.80			
<sup>a</sup> Calculated by	the compiler.								
		AUXILI	ARY IN	FORMA	TION				
METHOD/APP	ARATUS/PROC	CEDURE:		SOURCE AND PURITY OF MATERIALS:					
All procedures	identical to those	e given in the co	mpila-	C.p. grade acetone was treated with AgNO <sub>3</sub> and NaOH					
tion of this aut	hor's study of th	e		and the	resulting ppt v	as removed by filtra	tion. The		
AgBrO <sub>3</sub> -CH <sub>3</sub> OI	H-H <sub>2</sub> O system.			solvent was stored over $K_2CO_3$ , and distd from metallic sodium.					

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; A	gBrO <sub>3</sub> ; [7783	-89-3]	Owen, B. B.		
(2) 2-Propanone (acetone); C <sub>3</sub> H <sub>6</sub> O; [67-64-1]			J. Am. Chem.	Soc. <u>1933</u> , 55, 1922-8.	
(3) Water; H <sub>2</sub> O; [7732-18-5]					
VARIABLES:			PREPARED B	Y:	
Solvent composition					
T/K = 298			H. Miyamoto	and M. Salomon	
EXPERIMENTAL D	АТА:				
	[C <sub>3</sub> H <sub>6</sub> O]	[C <sub>3</sub> H <sub>6</sub> O]	AgBrO <sub>3</sub> soly	density	
	mass %	mass %ª	mmol dm <sup>-3</sup>	kg dm <sup>-3</sup>	
	0	0	8.12 <sup>b</sup>		
	10	3.3	5.92	0.9845	
	20	7.2	4.29	0.9700	
	30	11.7	3.00	0.9537	
	40	17.1	2.03	0.9355	
Calculated by the co	ompiler.	stand with 0.001 mms	l des stanson		
<sup>o</sup> Mean of 4 independent determinations with 0.004 mmol dm <sup>-3</sup> average deviation.					
		AUXILIARY IN	FORMATION		
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
All procedures identi	ical to those g	iven in the compila-	Acetone (Baker's "analyzed" or Eastman Kodak's prod-		
tion of this author's	study of the		uct) was distilled two times. Other details given in the		
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub>	O system.		compilation cited on the left.		

144		Silver Bromate				
COMPONENTS:			ORIGI	NAL MEASUREMENTS	j:	
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]						
(2) Sodium hydroxide; NaOH; [1310-73-2]			Davies	s, P. B.; Monk, C. B.		
(3) Acetic acid; $C_2H_4C$	12; [04-19-7] (04-19-7]	.11	J. Ch	am Soc 1951 2718-23		
(5) Water; H <sub>2</sub> O; [7732-	18-5]	-•1	0. 0.1	cm. 000. <u>1221</u> , 2710-23.		
	_					
VARIABLES:			PREPA	ARED BY:	······································	
Concentrations of NaC $T/K = 298.15$	H, $CH_3COOH$ and (	CH <sub>3</sub> C(O)CH <sub>3</sub>	Н. Мі	yamoto		
EXPERIMENTAL DAT	ГА:		<b>I</b>			
CH <sub>3</sub> C(O)CH <sub>3</sub>	contenta	NaOH o	oncn	CH <sub>3</sub> COOH concn	AgBrO <sub>3</sub> soly	
mass %	mol %	mol dn	1-8	mol dm-3	mmol dm-3	
21.1	76-	0		0	3.08	
21.1	7.07	0.0252	26	0.03837	3.96 4.94	
		0.0421	0	0.05180	5.37	
		-		-		
26.1	9.87	0	<b>A</b>	0	3.18	
		0.0297	2	0.05790	4.32	
		0.0639	 91	0.1236	5.19	
38.4	16.2 <sub>0</sub>	0		0	2.16	
		0.0252	0 0	0.03453	3.18	
		0.0421	v	0.05004	5.70	
39.5	16.84	0		0	2.07	
		0.0370	15	0.07237	3.51	
		0.0412	:8 :A	0.08088	3.62	
		0.0495	7	0.1005	5.05	
<sup>a</sup> Calculated by the com	ipiler.					
	A	UXILIARY IN	FORMA	ATION		
METHOD/APPARATU	JS/PROCEDURE:	<u></u>	SOURC	CE AND PURITY OF M	ATERIALS:	
<b>T</b>		<b>.</b>				
solutions were analyzed	for bromate by ad	Saturated dition of	solutions of (A.R. grade) KBrO <sub>3</sub> and AgNO <sub>3</sub> to a large			
excess KI to about 25	cm <sup>3</sup> aliquots followe	d by	volume of hot water. The precipitate was washed and			
addition of about 15 cr	m <sup>3</sup> of 1 mol dm- <sup>3</sup> H	<sub>2</sub> SO <sub>4</sub> . The	dried.			
aliquots were then titra	ited with standard th	hiosulfate				
solution using a starch	indicator.		AnalaR acetic acid was used. "Laboratory grade" acetone was used.			
			FSTIM	ATED ERROR		
			Soly: no	othing specified.		
			Temp:	precision $\pm$ 0.03 K.		
			REFER	ENCES:		

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	<u></u>				
COMPONENTS:		ORIGI	ORIGINAL MEASUREMENTS:		
(1) Silver bromate; AgBrO <sub>3</sub> ; [77	83-89-3]	Koizu	Koizumi, E.; Miyamoto, H.		
(2) Tetrahydrofuran; $C_4H_8O$ ; [1	(2) Tetrahydrofuran; $C_4H_8O$ ; [109-99-9]			<u>1956</u> , 29, 950-3.	
(3) Water; H <sub>2</sub> O; [7732-18-5]					
VARIABLES:		PREPA	RED BY:		
Solvent composition					
1/K = 293.15, 298.15 and 30	3.15	<u> </u>	yamoto		
EXPERIMENTAL DATA:					
C <sub>4</sub> H <sub>8</sub> O	content	silver brou	nate solubility/r	nmol dm-3	
mass %	mol %ª	20ºC	25ºC	30°C	
0.0	0.0	7.28	8.59	10.02	
3.347	0.858	6.34	7.62	8.99	
6.769	1.782	5.72	6.83	8.08	
12.645	3.490	4.73	5.81	6.82	
18.770	5.458	3.97	4.88	5.62	
24.471	7.489	3.39	4.23	4.79	
29.208	9.345	2.93	3.67	4.12	
35.670	12.168	2.51	2.90	3.28	
43.537	16.153	1.90	2.31	2.55	
54.513	23.042	1.34	1.53	1.77	
64.232	30.971	0.99	1.13	1.43	
•Calculated by the compiler.				<u> </u>	
	· AUXILI	ARY INFORM	ATION		
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
All procedures identical to those given in the			Tetrahydrofuran (Badische A.G.) was purified by two		
compilation of these authors' st	udy of the	fraction	fractional distillations.		
AgBrO <sub>3</sub> -sucrose-H <sub>2</sub> O system.					

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) 1,4-Dioxane; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; [123-91-1] (3) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL MEASUREMENTS: Koizumi, E.; Miyamoto, H. Nippon Kagaku Zasshi <u>1954</u> , 75, 1302-5.				
VARIABLES:				PREPA	RED BY:		
T/K = 293.15,	298.15 and 303	.15		H. Mi	yamoto		
EXPERIMENTA	L DATA:						
	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> co	ntent	sil	ver bron	nate solubility/n	nmol dm-3	
	mass %	mol %ª	20	°C	25ºC	30°C	
	0.0	0.0	7.2	28	8.59	10.02	
	2.494	0.520	6.9	)4	8.19	9.51	
	4.884	1.039	6.6	i8	7.69	9.02	
1	10.243	2.280	5.8	31	6.90	7.96	
	15.178	3.530	5.0	)4	6.06	6.90	
j	20.105	4.894	4.3	14	5.06	5.94	
	25.114	6.417	3.8	5	4.46	5.12	
]	30.219	8.134	3.2	9	3.96	4.64	
	37.694	11.008	2.6	i <b>5</b>	3.19	3.72	
<sup>a</sup> Calculated by t	he compiler.						
		AUXILI	ARY IN	FORMA	TION		
METHOD/APPARATUS/PROCEDURE: All procedures identical to those given in the compilation of these authors' study of the AgBrO <sub>3</sub> -sucrose-H <sub>2</sub> O system.			SOURC 1,4-Dio lized an	CE AND PURIT oxane (Takeda C ad distilled.	Y OF MATERIALS: Co., c.p. reagent) was rea	crystal-	

COMPONENTS:		_	ORIGINAL MEASUREMENTS:		
(1) Silver bromate; Agl	BrO <sub>3</sub> ; [7783-89-3	]	Monk, C. B.		
(2) 1,4-Dioxane; $C_4H_8$	$D_2; [123-91-1]$		J. Chem. Soc. 19	<u>951</u> , 2723-6.	
(3) Water; H <sub>2</sub> O; [7732-	18-5]				
VARIABLES:			PREPARED BY:		
Solvent composition					
T/K = 298			H. Miyamoto		
EXPERIMENTAL DAT	`A:	•			
C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> co	ontent	AgBrO <sub>s</sub> soly			
mass %	mol %ª	mmol kg-1	-log K <sup>0</sup> s0	ć	
10	2.2	6.24	4.496	69.7	
20	4.9	4.76	4.739	60.8	
*Calculated by the com	piler.				
The thermodynamic sol	lubility product	was calculated fr	om		
$log K_{s0}^{0} = 2log S - \left(\frac{78.54}{\epsilon}\right)^{3/2} \left(\frac{\sqrt{I}}{1+\sqrt{I}}\right) = 0.2I$					
where S is the solubility, I the ionic strength, and $\epsilon$ is the static permittivity of the solvent.					
AUXILIARY INFORMATION					
METHOD/APPARATU	S/PROCEDURE	:	SOURCE AND PURITY OF MATERIALS:		
Procedures identical to	those in the stud	lies by Monk,	AnalaR grade dio	xane was used. Other details given in	
and by Monk and Davi	es compiled thro	ughout this	the various compilations of Monk, and Monk and		

Davies' studies.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver bromate; A	gBrO <sub>3</sub> ; [7783-89-3]				
(2) Sodium hydroxide; NaOH; [1310-73-2]			Davie	s, P. B.; Monk, C. B.	
(3) Acetic acid; $C_2H_4$	O <sub>2</sub> ; [64-19-7]				
(4) 1,4-Dioxane; $C_4H_1$	<sub>8</sub> O <sub>2</sub> ; [123-91-1]		J. Ch	em. Soc. <u>1951</u> , 2718-23.	·
(5) water; H <sub>2</sub> O; [//52	-18-5]				
VARIABLES:	OH CH.COOH and	1 A. diarana	PREPA	ARED BY:	
T/K = 298.15	UR, Ch3COUR and	1,4-uioxane	Н. М	iyamoto	
EXPERIMENTAL DA	TA:	<u></u>			
C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	$C_4H_8O_2$	NaOH co	oncn	CH <sub>3</sub> COOH concn	AgBrO <sub>3</sub> soly
mass %	mol %*	mol dr	n-3	mol dm-3	mmol dm- <sup>3</sup>
15.0	3.4 <sub>8</sub>	0		0	5.16
		0.0390	)6	0.03522	6.52
		0.0516	50	0.05776	7.07
22.5	5.60	0		0	4.03
	-	0.0504	11	0.05649	6.05
•Calculated by the con	mpiler.				
	A	UXILIARY IN	IFORM.	ATION	
METHOD/APPARAT	US/PROCEDURE:		SOUR	CE AND PURITY OF M	IATERIALS:
Procedures identical to those in the compilation of			"Laboratory grade" ethylene glycol was used. Other		
these authors' study o	f the		details	given in the compilation	n cited on the left.
AgBrO <sub>3</sub> -NaOH-CH <sub>3</sub> COOH-CH <sub>3</sub> CH <sub>2</sub> OH-H <sub>2</sub> O system.					

chapter.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Ethylene carbonate; C <sub>3</sub> H <sub>4</sub> O <sub>3</sub> ; [96-49-1] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Miyamoto, H.; Watanabe, Y. Nippon Kagaku Zasshi <u>1967</u> , 88, 36-8.
VARIABLES: Solvent composition T/K = 298.15 and 308.15	PREPARED BY: H. Miyamoto

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t/ºC	[C3H4O3] mass %	[C3H4O3] mol %ª	AgBrO <sub>3</sub> soly mmol dm <sup>-3</sup>	
25	0	0	8.59	
	5.121	1.092	8.14	
	9.935	2.207	7.80	
	20.704	5.070	7.16	
	29.997	8.060	6.41	
	40.102	12.046	5.36	
	49.997	16.981	4.40	
	59.996	23.478	3.16	
	79.969	44.955	1.10	
35	0	0	11.62	
	5.205	1.111	11.21	
	10.002	2.223	10.80	
	20.000	4.865	9.90	
	30.194	8.129	8.66	
	40.018	12.009	7.25	
	50.377	17.197	5.74	
	60.011	23.489	4.22	
	80.058	45.093	1.36	
	93.584	74.899	0.19	

<sup>a</sup>Calculated by the compiler.

AUXILIARY IN	IFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Excess $AgBrO_3$ and the mixed solvent were placed into glass-stoppered bottles. The bottles were rotated in a thermostat at a given temperature for 72 hours. After allowing excess solid to settle, aliquots of saturated solution were withdrawn and analyzed for total silver by adding a measured excess of NaCl solution followed by backtrating the excess chloride with $AgNO_3$ using dichlorofluorescein indicator.	AgBrO <sub>3</sub> prepared by addition of dilute solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> (Wako, Co. guaranteed reagent) to a large volume of a dilute KNO <sub>3</sub> solution. The solution was boiled and then aged. The precipitate was washed and dried under reduced pressure. Ethylene carbonate (Tokyo Kasei Co. guaranteed reagent) was distilled two times under reduced pressure.
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K.
	REFERENCES:

COMPONENTS	·····			
COMPONENTS:			ORIGINAL MEASUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ; $[7783-89-3]$			Jacondhaman, C., K-Pitar, C.	
			Janardhanan, S.; Kalidas, C.	
(2) Sulfinyl bis-methane (dimethyl sulfoxide); $C_2H_6OS$ ;				
			Bull. Chem. Soc. Jpn <u>1980</u> , 53, 2363-5.	
(3) water; $H_2O$ ; [7732-18-5]				
VARIABLES:			PREPARED BY:	
Solvent composition				
T/K = 303.2			H. Miyamoto	
EXPERIMENTAL DATA:				
	(CH <sub>3</sub> ) <sub>2</sub> SO	(CH <sub>3</sub> ) <sub>2</sub>	SO AgBrO <sub>3</sub> soly	
	mol fraction	mass of	‰ mol kg-1	
	0	0	0.0098	
l	0.1	32.5	0.0080	
	0.2	52.0	0.0071	
	0.3	65.0	0.0087	
	0.4	74.3	0.0114	
	0.5	81.3	0.0140	
	0.6	86.7	0.0184	
	0.7	91.0	0.0227	
	0.8	94.5	0.0277	
	0.9	97.5	0.0333	
	1.0	100.0	0.0379	
	AUX	ILIARY IN	FORMATION	
METHOD/APPARATUS/PF	ROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Excess AgBrO <sub>3</sub> was vigorously shaken in (CH <sub>3</sub> ) <sub>2</sub> SO-H <sub>2</sub> O mixtures for 24 hours, and then transferred to a thermostat maintained at $30 \pm 0.1^{\circ}$ C. The solutions were stirred for an additional 24 hours to insure attainment of equilibrium. The mixtures were centrifuged, and aliquots analyzed for bromate by addition of excess standard aqueous KI solution followed by potentiometric titration with standard AgNO <sub>3</sub> .		ten ± 0.1°C. 24 hours to res were te by to by to n hdard	Silver bromate was prepared by reaction of $AgNO_3$ with KBrO <sub>3</sub> . The precipitate was first washed with water, then with acetone, and dried under vacuum at 70-80°C for several hours. The purity of the salt was checked by determination of its silver content. (CH <sub>3</sub> ) <sub>2</sub> SO (BDH, LR grade) was heated over NaOH for 2 hours at 90°C, and then flash-distilled under vacuum. Doubly distilled water was used.	
			ESTIMATED ERROR:	
			Soly: nothing specified.	
			Temp: precision $\pm$ 0.1 K.	
			REFERENCES:	

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [778	33-89-3]	Dash, U.N.
(2) Perchloric acid: HClO <sub>4</sub> : 1760	1-90-31	
(3) Formamide: CH_NO: 175-12-	.71	Thermochim, Acta 1975, 11, 25-33.
(4) Water: $H_{0}O$ : [7732-18-5]	.1	1 101 1100 1111 1100 <u>1270</u> , 11, 20 55.
(4) water, 1120, [//52-10-5]		
VADIADI ES.	· ····· ··· ··· ··· ··· ··· ···	DEFRADED BV.
Concentration of HClO		TREFARED DI:
T/K = 298.15, 303.15  and  308.13	5	H. Miyamoto
EXPERIMENTAL DATA:		
Note that the solubility, S, of A	gBrO <sub>3</sub> in HClO <sub>4</sub> /forman	nide solutions prepared from 70 % (in water) HClO <sub>4</sub> .
	HClO <sub>4</sub> concn	solubility
t/ºC	mol dm-3	mol dm-3
1		,
25	0.02735	0.02080
	0.03543	0.02118
	0.04645	0.02185
	0.06352	0.02291
	0.08539	0.02442
	0.09315	0.02501
	0 10420	0.02570
	0.10420	0.04310
30	0.02876	0.02236
20	0.04860	0.02338
	0.05045	0.02393
í l	0.03343	0.02535
	0.09342	0.02020
	0.10812	0.02702
	0.11992	0.02838
35	0.02625	0.02344
	0.03225	0.02396
	0.05226	0 02493
	0.06180	0.02570
	0.07185	0.02637
	0.09766	0.02754
0.09700		0.02104
	AUXILIARY IN	NFORMATION
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Solutions were prepared by disso	lving weighed amounts	Details state to be similar to those in (1), AgBrOs
of 70 % HClO <sub>4</sub> in known (weigh	ed) amounts of	prepared by slow addition of AgNO <sub>2</sub> and KBrO <sub>2</sub> slns to
formamide at an ice-cold temper	rature to prevent	distilled H <sub>2</sub> O while stirring. The precipitate was
decomposition of formamide up	on mixing. These	washed and dried HCIO of G R quality (70 % in
mixtures were placed in other-	colored glass-stoppered	aqueous solution) was used
hattles containing excess AgPro	The hottles were	
bottles containing excess AgBro	, the bounds were	Commercial formamide was treated with CoO and
stoppered and heavily paralilined	i, and then rotated in a	distilled at advant w
water thermostat at a specified t	emperature for 7 to 8	distined at reduced pressure.
hours (see ref. (1)).		
$AgBrO_3$ in the satd slns detd iodometrically using 0.01 mol dm <sup>-3</sup> $Na_2S_2O_3$ sln and a microburet. Each solubility value is the average of "three closely agreeing		ESTIMATED ERROR:
		Soly: reproducibility not given, but titrns accurate to
		± 0.2 %.
results."		Temp: precision ± 0.01 K.
		BEFEDENCES.
		INAPERENCED:
		1. wayak, B.; Dasn, U.N. Thermochim. Acta <u>1973</u> ,
		0, 223.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
	Giridhar, V. V.; Kalidas, C.
(2) N,N-Dimethylformamide; C <sub>3</sub> H <sub>7</sub> NO; [68-12-2]	
	Proc. Indian Acad. Sci. <u>1984</u> , 93, 795-800.
(3) Water; H <sub>2</sub> O; [7732-18-5]	,
VADIADI EC.	DDEBADED DV.
VARIABLES: Solvent composition	PREPARED BI:
T/K = 303.15	H. Miyamoto and M. Salomon
EXPERIMENTAL DATA:	
mole frequing me	Agenta and legal
mole traction in:	ass % minor kg-1
•	
0	0 10.2
0.1	51.1 5.20
0.2	00.4 3.08
0.3	2.19 10.0 1.00
0.4	1.83
0.5	SU.2 I.31
0.6	15.9 U.90
0.7	90.4 0.62
0.8	94.2 0.52
0.9	77.3 0.34
1.0 10	00 0.21
AUXILIARY IN	FORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Solubilities were determined by a potentiometric	$A_{\alpha}B_{\alpha}O_{\alpha}$ nrand as in (2); i.e. by reaction of AgNO <sub>2</sub> with
method as in (1) See the compilation of the	KBrO. The pat was thoroughly washed with water
Aglo <sub>2</sub> -(CH <sub>2</sub> ) <sub>2</sub> SO <sub>2</sub> CH <sub>2</sub> OH system for details on this	and then with acetone and dried in vacuum for several
method	hours at 70-800C Purity was checked by notentiomet-
method.	ric determination of silver content HCON(CHa)a
Thermodynamic solubility product constants calculated	(BDH LR) dist under vac was dried over anbydr
using the extended Debye-Hückel equation with an ion	CuSO <sub>4</sub> for one week, and finally distilling again under
size parameter of 0.65 nm, but not reported in the	vac. The product had a b.p. of 15% at 15 mm Hg.
original paper. The authors use these $K_{00}$ values to	and at 25% had a density of $0.9441$ g cm <sup>-3</sup> , np =
calculate Gibbs energies of transfer from water to the	1.4268, and an electrolytic conductance of $1.05 \times 10^{-7}$ S
water-dimethylformamide mixed solvents. Values of	cm <sup>-1</sup> . Doubly distilled conductivity water was used in
$\Delta G^{0}(AgBrO_{\bullet})$ are given in the paper	the preparation of solvent mixtures
-o Kullarog, and Brow in the paper.	
	ESTIMATED ERROR:
	Soly: nothing specified.
	Temp: precision ± 0.1 K.
	REFERENCES:
	1. Kalidas, C.; Sivaprasad, P. Indian J. Chem. <u>1979</u> ,
	A17, 79.
	2. Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn.
	2. Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn. <u>1980</u> , 53, 2363.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Urea; CH <sub>4</sub> N <sub>2</sub> O; [57-13-6] (3) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL Miyamoto, Nippon Kaj	MEASUREMEI H. 3aku Zasshi <u>19</u> 0	NTS: 50, 81, 54-7.	
VARIABLES: Solvent composition T/K = 288.15, 293.15, 298.15 and 303.15			PREPARED H. Miyamo	BY: to		
EXPERIN	MENTAL DATA	A:			<u></u>	<u> </u>
1	H2NCON	H <sub>2</sub> content	si	lver bromate sol	ubility/mmol di	n-3
	mass %	mol %ª	15ºC	20ºC	25ºC	30°C
	0.0	0.0	6.07	7.28	8.59	10.02
	10.077	3.252	8.71	10.19	11.98	13.35
	20.054	6.998	11.61	13.39	15.44	16.89
	29.896	11.342	14.85	16.87	19.19	20.40
	39.143	16.174	18.85	21.39	23.60	25.63
•Calculate	ed by the comp	iler.				
	<u> </u>	<u> </u>	AUXILIARY	INFORMATIO	N	
METHOD/APPARATUS/PROCEDURE:			SOURCE A	ND PURITY O	F MATERIALS:	
All procedures identical to those given in the			Urea (Kanto	Urea (Kanto Kagaku Co. guaranteed reagent) was		
compilation of this author's study of the			recrystallized	recrystallized three times and dried under reduced		
AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.				pressure.		

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COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Glycine; C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ; [56-40-6] (3) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Owen, B. B. J. Am. Chem. Soc. <u>1933</u> , 55, 1922-8.			
VARIABLES: Concentration of T/K = 298	of glycine		PREPARED BY H. Miyamoto	•	
EXPERIMENT	AL DATA:				
	[C2H5NO2] mass %	[C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub> ] mass % <sup>a</sup>	AgBrO3 soly <sup>b</sup> mmol dm <sup>-3</sup>	density kg dm- <sup>3</sup>	
	0	0	8.12°		
	5	1.2	12.9	1.0184	
	10	2.6	18.4	1.0395	
	15	4.1	24.9	1.0613	
<sup>a</sup> Calculated by <sup>b</sup> Mean of 4 ind <sup>c</sup> A "heavy purp	the compiler. ependent determin lish turbidity" was	nations with 0.004 noted in the equi	mmol dm- <sup>3</sup> average d ilibrated solutions, pos	eviation.	e reaction.

The author claims the results to be qualitative because of the glycine impurities.

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: All procedures identical to those given in the compilation of this author's study of the AgBrO <sub>3</sub> -CH <sub>3</sub> OH-H <sub>2</sub> O system.	SOURCE AND PURITY OF MATERIALS: Glycine, a "domestic" commercial product contained organic impurities which imparted a tan color to its solutions. See the compilation cited on the left for other details.		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
	Subramanian, S.; Rao, S.C.A.V.S.S.; Kalidas, C.
(2) Acetonitrile; C <sub>2</sub> H <sub>3</sub> N; [75-05-8]	
	Indian J. Chem. Sec. A <u>1981</u> , 20, 723-5.
(3) Water; $H_2O$ ; [7732-18-5]	
VARIABLES: Solvent composition	PREPARED BY:
T/K = 303.2	H. Miyamoto
EXPERIMENTAL DATA:	1
CH3CN	CH <sub>3</sub> CN AgBrO <sub>3</sub> soly

CH <sub>3</sub> CN mol fraction	CH <sub>3</sub> CN mass %ª	AgBrO <sub>3</sub> sol mol kg <sup>-1</sup>
0	0	0.0102
0.1	20.2	0.0732
0.2	36.3	0.0914
0.3	49.4	0.0852
0.4	60.3	0.0696
0.5	69.5	0.0554
0.6	77.4	0.0404
0.7	84.2	0.0244
0.8	90.1	0.0127
0.9	95.4	0.00477
1.0	100.0	0.00187

•Calculated by the compiler.

### AUXILIARY INFORMATION SOURCE AND PURITY OF MATERIALS: METHOD/APPARATUS/PROCEDURE: Excess AgBrO<sub>3</sub> was vigorously shaken in CH<sub>3</sub>CN-H<sub>2</sub>O Silver bromate was prepared by reaction of AgNO<sub>3</sub> mixtures for 24 hours, and then transferred to a with KBrO<sub>3</sub>. The precipitate was first washed with thermostat maintained at $30 \pm 0.1$ °C. The solutions water, then with acetone, and dried under vacuum at were stirred for an additional 24 hours to insure 70-80°C for several hours. The purity of the salt was attainment of equilibrium. The mixtures were cenchecked by determination of its silver content. CH<sub>3</sub>CN trifuged, and aliquots analyzed for bromate by addition (BDH, LR grade), after a preliminary distillation, was of excess standard aqueous KI solution followed by dried with anhydrous K<sub>2</sub>CO<sub>3</sub>, and then further purified as described in (1): the product had a b.p. = $80^{\circ}$ C, and potentiometric titration with standard AgNO<sub>3</sub>. at 25°C, d = 0.7766 g cm<sup>-3</sup> and $n_d = 1.3436$ . Doubly distilled water was used. **ESTIMATED ERROR:** Soly: reproducibility better than $\pm 1$ %. Temp: precision $\pm$ 0.1 K. **REFERENCES:** 1. Jayadevappa, E. S. Indian J. Chem. 1969, 7, 1146.

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Pyridine; C <sub>6</sub> H <sub>6</sub> N; [110-86-1] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Vosburgh, W.C.; Cogswell, S.A. J. Am. Chem. Soc. <u>1943</u> , 65, 2412-3.
VARIABLES: Concentration of pyridine T/K = 298.15	PREPARED BY: H. Miyamoto

The solubility, S, of  $AgBrO_3$  in aqueous pyridine solutions is given in the table below.

10 <sup>3</sup> S
mol kg <sup>-1</sup>
8.27
9.80
10.32
11.49
12.34

The authors computed a value of  $K_1 = 0.096$  mol kg<sup>-1</sup> where  $K_1$  is defined as follows:

v		$[Ag^*][C_5H_5N]$
V I	-	$[Ag(C_{\mathfrak{S}}H_{\mathfrak{S}}N)^{*}]$

AUXILIARY I	NFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
The procedure was as follows (1). Pyridine solutions were saturated with AgBrO <sub>3</sub> in Pyrex flasks immersed in a water bath at 25.00°C, and avoiding diffused daylight or artificial light. Samples for analyses were taken after 3-4 h, and again two or more h later to for constancy in concentrations. The aliquots were removed with a pipet to which was attached a filter either of Pyrex glass wool or Pyrex fritted glass.	AgBrO <sub>3</sub> prepared by slow precipitation from solutions of AgNO <sub>3</sub> and KBrO <sub>3</sub> . Analysis for silver gave 45.70 % (calculated is 45.75 %). Practical grade pyridine was refluxed over BaO and distilled through a Widmer column. A fraction within a 0.2 K boiling range was used.	
Aliquots were weighed and the iodate content deter- mined iodometrically with 0.01 mol dm <sup>-3</sup> thiosulfate solution. Ammonium molybdate was used as a catalyst.	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.05 K.	
	REFERENCES: <ol> <li>Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am. Chem. Soc. <u>1941</u>, 63, 2670.</li> </ol>	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	Palanivel, A.; Rajendran, G.; Kalidas, C.
(2) Pyridine; C <sub>5</sub> H <sub>5</sub> N; [110-86-1]	Ber. Bunsen. Ges. Phys. Chem. <u>1986</u> , 90, 794-7.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
T/K = 303.15	H. Miyamoto and M. Salomon

# EXPERIMENTAL DATA:

pyridine content		solubility	K <sub>s0</sub> b
mol fraction	mass %ª	mol kg-1	mol <sup>2</sup> kg <sup>-2</sup>
0.0	0.0	0.01	0.0000820
0.1	32.8	1,18	0.4964
0.2	52.3	1.52	0.5822
0.3	65.3	1.73	0.4958
0.4	79.5	1.93	0.3934
0.5	81.4	2.04	0.2934
0.6	86.8	1.97	0.1210
0.7	91.1	1.89	0.0493
0.8	94.6	1.78	0.0167
0.9	97.5	1.63	0.00848
1.0	100.0	1.37	0.00322

<sup>a</sup>Calculated by the compilers.

<sup>b</sup>These are thermodynamic solubility product constants.

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Experimental method compositions are accu solubility measuremen and the agreement wa	given in reference (1). Solvent trate to within $\pm$ 0.02 %. All nts were carried out at least twice, as better than $\pm$ 0.2 %.	AgBrO <sub>3</sub> prepd by reaction of AgNO <sub>3</sub> with KBrO <sub>3</sub> . The ppt was thoroughly washed with water and then with acetone, and dried in vacuum for several hours at 70-80°C. Purity of all salts checked by potentiometric determination of silver content. Pyridine was refluxed
Thermodynamic solubility product constants calculated		over KOH for 8 h followed by fractional distillation.
size parameter of 0.60 were detd with a DK Nachf. KG, Dresden) %.	by e-Huckel equation with an ion 0 nm. Dielectric constants, $\epsilon$ , meter 60 GK (Franz Kustner ) and are accurate to within $\pm$ 0.2	collected and stored over fresh KOH. At 25°C, this product had a density of 0.9787 g cm <sup>-3</sup> and a viscosity of 0.885 cP. Doubly distilled conductivity water was used in the preparation of solvent mixtures.
mole % pyridine	£	ESTIMATED ERROR:
0.0 0.1 0.2 0.3	76.7 62.7 50.1 40.0	Soly: precision better than ± 0.2 %. Temp: precision ± 0.05 K.
0.4	33.0	REFERENCES:
0.5	28.5	1. Kalidas, C.; Schneider, H. Z. Phys. Chem. N.F.
0.6	22.2	<u>1981,</u> 10, 487.
0.7	18.2	
0.8	15.0	2. Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn.
0.9	13.7	<u>1980,</u> 53, 2363.
L	لى ر ما 1	l

COMPONENTS: (1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3] (2) Tetraethylammonium perchlorate; C <sub>8</sub> H <sub>20</sub> NClO <sub>4</sub> ; [2567-83-1] (3) Tetraethylammonium bromate; C <sub>8</sub> H <sub>20</sub> BrO <sub>3</sub> ; [82150-35-4] (4) Nitromethane; CH <sub>3</sub> NO <sub>2</sub> ; [75-52-5]	<ul> <li>ORIGINAL MEASUREMENTS:</li> <li>(a) Badoz-Lambling, J.; Bardin, J. C. Electrochim. Acta <u>1974</u>, 19, 725-31.</li> <li>(b) Bardin, J. C. J. Electroanal. Chem. Interfacial Electrochem. <u>1970</u>, 28, 157-76.</li> <li>(c) Badoz-Lambling, J.; Bardin, J. C.</li> </ul>
VARIABLES: T/K = 293	C.R. Acad. Sci. Ser. C <u>1968</u> , 266, 95-9. PREPARED BY: H. Miyamoto and E. M. Woolley

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The value of  $K_{s0} = [Ag+][BrO_3-]$  in nitromethane solution was determined from the analysis of the potentiometric titration curve for titration of  $(C_2H_5)_4NBrO_3$  with AgClO<sub>4</sub>. The ionic strength was probably held constant at 0.1 mol dm-<sup>3</sup> using  $(C_2H_5)_4NClO_4$ . The authors reported the following value for the concentration solubility product at 20°C:

$$-log K_{s0} = 13.0$$

From this value, the compilers calculate  $K_{s0} = 1 \times 10^{-13} \text{ mol}^2 \text{ dm}^{-6}$ .

Thus, the solubility in nitromethane in a solution of ionic strength of 0.1 mol dm<sup>-3</sup> appears to be around 3 x  $10^{-7}$  mol dm<sup>-3</sup> (compilers).

Note that the original values reported in 1968 (ref. (a)) were corrected in 1970 (ref. (b)), and again in the 1974 reference. The latter correction was primarily concerned with accounting for impurities in nitromethane.

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Potentiometric titration method using the Ag/Ag <sup>+</sup> reference electrode. AgClO <sub>4</sub> was titrated into $(C_2H_5)_4NBrO_3$ solution, and from the measured e.m.f., the value of $K_{s0} = [Ag^+][BrO_3^-]$ was calculated. The standard e.m.f. for the Ag/Ag <sup>+</sup> reference electrode was determined from measurements on dilute AgClO <sub>4</sub> solutions in the presence of 0.01 mol dm <sup>-3</sup> HClO <sub>4</sub> .	Eastman practical grade $CH_3NO_2$ was thoroughly washed successively with $Na_2CO_5$ , $NaHSO_3$ , and $H_2SO_4$ aqueous solutions. It was then dried over $CuSO_4$ and distilled from boric acid. A center fraction collected at 110°C was dried and stored over $CaSO_4$ under $N_2$ . The product contained 0.005 mol dm <sup>-3</sup> water, and small amounts of $C_2H_5NO_2$ and $C_3H_7NO_2$ . Electrodes were prepared according to ref. (1).		
The potentiometric titrations were probably carried out at a constant ionic strength of 0.1 mol dm <sup>-3</sup> . The authors stated that the results were verified by voltammetry.	ESTIMATED ERROR: log $K_{*0}$ : precision $\pm$ 0.2 (authors, 1968). Soly: nothing specified. Temp: nothing specified.		
	REFERENCES: 1. Cauquis, G.; Serve, D. Bull. Soc. Chim. Fr. <u>1966</u> , 302.		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
(2) Tetrabutylammonium perchlorate; C <sub>16</sub> H <sub>36</sub> NClO <sub>4</sub> ; [1923-70-2]	Caillet, A.; Demange-Guerin, G. J.
<ul> <li>(3) Tetrabutylammonium bromate; C<sub>16</sub>H<sub>36</sub>BrO<sub>3</sub>;</li> <li>[39692-41-6]</li> </ul>	J. Electroanal. Chem. Interfacial Electrochem. <u>1972</u> , 40, 187-96.
(4) 1,2-Dimethoxyethane; $C_4H_{10}O_2$ ; [110-71-4]	
VARIABLES:	PREPARED BY:
T/K = 298	H. Miyamoto and E. M. Woolley

Complete experimental numerical data not reported, but were interpreted in terms of the following equilibria accounting for ion association (ionic strength =  $0.1 \text{ mol } \text{dm}^{-3}$ ):

 $AgBrO_{3}(s) + (C_{4}H_{9})_{4}NClO_{4} \Leftrightarrow AgClO_{4} + (C_{4}H_{9})_{4}NBrO_{3} \qquad pK^{*}_{0} = 9.8 \pm 0.5$ 

From this value, the compilers calculate

 $K_{s0}^* = [AgClO_4][(C_4H_9)_4NBrO_3] = 1.6 (\pm 1) \times 10^{-10} \text{ mol}^2 \text{ dm}^{-6}.$ 

Correcting for ion association, the following are obtained:

 $AgBrO_3(s) \Leftrightarrow Ag^+ + BrO_3^-$  pK = 12.0 (authors)

 $K_{s0} = [Ag+][BrO_{3}-] = 1 \times 10^{-12} \text{ mol}^2 \text{ dm}^{-3}$  (compilers)

The effects of ion pairing were accounted for by the equation

 $pK_{s0} = pK^*_{s0} + pK_d(AgClO_4) + pK_d((C_4H_9)_4NBrO_3)) + pK_d((C_4H_9)_4NClO_4)$ 

where  $K_d$  is the dissociation constant for the indicated ion pair. The values of  $pK_d = 3.8$  for AgClO<sub>4</sub> and 5.1 for  $(C_4H_9)_4$ NClO<sub>4</sub> are from ref. (1):  $pK_d = 3.5$  for  $(C_4H_9)_4$ NBrO<sub>3</sub> was assumed by analogy. (Note that an apparent typographical error in the paper lists this last  $pK_d$  value as 4.5).

#### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Potentiometric titration method using the following cell:	Nothing specified, but the compilers assume that the purification of 1,2-dimethoxyethane and the source of the electrolytes are similar to that described in (1). In
Ag   MBrO <sub>3</sub> (c <sub>1</sub> ), MClO <sub>4</sub> (c <sub>2</sub> ), AgClO <sub>4</sub> (c <sub>3</sub> )    ref	(1), the solvent was refluxed in $N_2$ over Na for 4 hours, and then fractionally distilled. The water
where M represents $(C_4H_9)_4N$ , $c_1$ is probably 0.05 mol dm <sup>-3</sup> , $c_2 = 0.1$ mol dm <sup>-3</sup> , and $c_3$ is the concn of AgClO <sub>4</sub> titrated into the solution. The reference electrode is probably the same as in ref. (1):	content was determined to be 0.005 mol dm <sup>-3</sup> .
ref = $AgClO_4(c_4)$ , $MClO_4(c_2)   Ag$	ESTIMATED ERROR:
where $c_4 = 0.01$ mol dm <sup>-3</sup> . The equilibrium constant was calcd from the potentials along the titration curve.	Soly: nothing specified. Temp: nothing specified.
	REFERENCES: 1. Caillet, A.; Demange-Guerin, G. J. Electroanal. Chem. Interfacial Electrochem. <u>1972</u> , 40, 69.

COMPONENTS:	ORIGINAL MEASUREMENTS:
<ol> <li>Silver bromate; AgBrO<sub>3</sub>; [7783-89-3]</li> <li>Tetrabutylammonium perchlorate; C<sub>16</sub>H<sub>36</sub>NClO<sub>4</sub>; [1923-70-2]</li> </ol>	Caillet, A.; Demange-Guerin, G. J.
(3) Tetrabutylammonium bromate; C <sub>16</sub> H <sub>36</sub> BrO <sub>3</sub> ; [39692-41-6]	J. Electroanal. Chem. Interfacial Electrochem. <u>1972</u> , 40, 187-96.
(4) Tetrahydrofuran; C <sub>4</sub> H <sub>8</sub> O; [109-99-9]	
VARIABLES:	PREPARED BY:
T/K = 298	H. Miyamoto and E. M. Woolley

Complete experimental numerical data not reported, but were interpreted in terms of the following equilibria accounting for ion association (ionic strength =  $0.1 \mod \text{dm}^{-3}$ ):

 $AgBrO_{3}(s) + (C_{4}H_{9})_{4}NClO_{4} \Leftrightarrow AgClO_{4} + (C_{4}H_{9})_{4}NBrO_{3} \qquad pK^{*}_{s0} = 11.1 \pm 0.5$ 

From this value, the compilers calculate

 $K_{s0}^* = [AgClO_4][(C_4H_9)_4NBrO_3] = 8 (\pm 6) \times 10^{-12} mol^2 dm^{-6}.$ 

Correcting for ion association, the following are obtained:

 $AgBrO_3(s) \Leftrightarrow Ag^+ + BrO_3^-$  pK = 11.2 (authors)

 $K_{s0} = [Ag^+][BrO_3^-] = 6 \times 10^{-12} \text{ mol}^2 \text{ dm}^{-3}$  (compilers)

The effects of ion pairing were accounted for by the equation

 $pK_{s0} = pK^{*}_{s0} + pK_{d}(AgClO_{4}) + pK_{d}((C_{4}H_{9})_{4}NBrO_{3})) + pK_{d}((C_{4}H_{9})_{4}NClO_{4})$ 

where  $K_d$  is the dissociation constant for the indicated ion pair. The above  $pK_d$  values were not given.  $pK_d$  for  $(C_4H_9)_4NBrO_3$  was assumed.

AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Potentiometric titration method using the following cell:	Nothing specified, but the compilers assume that the purification of 1,2-dimethoxyethane and the source of the electrolytes are similar to that described in (1). In	
Ag   MBrO <sub>3</sub> (c <sub>1</sub> ), MClO <sub>4</sub> (c <sub>2</sub> ), AgClO <sub>4</sub> (c <sub>3</sub> )    ref	(1), the solvent was stored over K for 15 days, refluxed in $N_2$ over Na for 4 hours, and then fractionally	
where M represents $(C_4H_9)_4N$ , $c_1$ is probably 0.05 mol dm <sup>-3</sup> , $c_2 = 0.1$ mol dm <sup>-3</sup> , and $c_3$ is the concn of	distilled. The water content was determined to be 0.005 mol dm <sup>-3</sup> .	
AgClO <sub>4</sub> titrated into the solution. The reference electrode is probably the same as in ref. $(1)$ :		
ref = $AgClO_4(c_4)$ , $MClO_4(c_2)$   $Ag$	<b>ESTIMATED ERROR:</b> $log K_{s0} \pm 0.5$ (error not defined).	
where $c_4 = 0.01$ mol dm <sup>-3</sup> . The equilibrium constant was calcd from the potentials along the titration curve.	Soly: nothing specified. Temp: nothing specified.	
	REFERENCES: 1. Caillet, A.; Demange-Guerin, G. J. Electroanal. Chem. Interfacial Electrochem. <u>1972</u> , 40, 69.	

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COMPONENTS:		ORIGINAL MEAS	UREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-	89-3]		
		Dash, U. N.; Nayak, B.	
(2) Sodium perchlorate; NaClO <sub>4</sub> ; [7601-89-0]			
		Thermochim. Acta	1 <u>975,</u> 11, 17-24.
(3) Formamide; CH <sub>3</sub> NO; [75-12-7]			
VARIABLES:		PREPARED BY:	
Concentration of NaClO <sub>4</sub> $T/K = 208.15$ and $308.1$	<	U. Minamata and	
17K = 298.13, 303.13 and 308.1		H. Milyamoto and	E. M. WOONEy
EXPERIMENTAL DATA:			
	NaClO <sub>4</sub> concn	AgBrO <sub>3</sub> soly	-log S*
t/ºC	mol dm <sup>-3</sup>	mol dm-3	(eq. [1])
	0.10400	0.010/5	
25	0.10420	0.01965	1.7865
	0.09315	0.01960	1.7849
	0.08539	0.01955	1.7840
	0.06352	0.01950	1.7787
	0.04645	0.01940	1.7749
	0.03543	0.01905	1.7782
	0.02735	0.01890	1.7778
	0.00759	0.01862	1.7729
30	0.11992	0.02121	1.7575
	0.10812	0.02101	1.7590
	0.09342	0.02086	1.7584
	0.05945	0.02076	1.7507
	0.04860	0.02054	1.7514
	0.02876	0.02034	1.7475
35	0.09766	0.02220	1.7332
	0.07185	0.02211	1.7279
	0.06180	0.02178	1.7312
	0.05226	0.02170	1.7296
	0.03225	0.02165	1.7227
	0.02625	0.02152	1.7226
	0.01470	0.02136	1.7197
			continued
	AUXILIARY IN	FORMATION	
METHOD/APPARATUS/PROCED	URE:	SOURCE AND PUT	RITY OF MATERIALS:
Solutions of NaClO <sub>4</sub> in formamide	were prepared by	AgBrO <sub>2</sub> prepd by a	ddition of solutions of AgNO <sub>3</sub> and
weight and placed into amber-colo	red glass-stonnered	K BrOs to mechanically-stirred distilled water at room	
bottles containing excess AgBrOs	The stonners were	temp for a period of	of 5 hours. The product was washed
heavily paraffined and the bottles	were then rotated in	and dried NaClO	prend from Na-CO- and a slight
a water thermostat of a given term	were then forated in	and uneu. Nacio4	The enhydr selt was obtained by
a water mermostat at a given temp	erature for 7-6	excess of ull HCiO	. The annyul sait was obtained by
nours (see ref. (1)). Solubilities we	re determined by	recrystallization above 50°C, and it was dried in a	
No S O polytica in a size land	ng U.UI mol am-3	current of dry air. Commercial formamide was treated	
$Na_2S_2O_3$ solution in a microouret.		with CaO and distil	ned under reduced pressure.
		ESTIMATED ERRO	DR:
		Titrn accuracy ± 0.3	2 %.
		Soly: nothing specif	ied.
		Temp: precision ± 0	0.01 K.
		<b>REFERENCES</b> :	
		1. Nayak, B.; Dash.	U.N. Thermochim. Acta 1973, 6,
		223.	
		2. Agarwal, R.K.; N	Nayak, B. J. Phys. Chem. <u>1966,</u> 70,
		2568: <u>1967</u> , 71,	2062.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]	
	Dash, U. N.; Nayak, B.
(2) Sodium perchlorate; NaClO <sub>4</sub> ; [7601-89-0]	
	Thermochim. Acta <u>1975</u> , 11, 17-24.
(3) Formamide; CH <sub>3</sub> NO; [75-12-7]	

#### EXPERIMENTAL DATA: (continued......)

Values of log S\* in the data tables were calculated by the authors from

$$\log S' = \log S - \frac{AI^{1/2}}{1 + I^{1/2}}$$
[1]

where S is the experimental solubility,  $I = S + [NaClO_4]$ , and values of A were taken from ref. (1). Plots of log S<sup>\*</sup> against I were linear, and the intercepts (S<sup>0</sup>) and slopes (B) are given in the table below (these calculations by the compilers).

t∕⁰C	A mol <sup>-1/2</sup> dm <sup>3/2</sup>	-B mol-1 dm <sup>3</sup>	S <sup>0</sup> mol dm-3
25	0.307	0.132	0.01700
30	0.308	0.125	0.01811
35	0.309	0.159	0.01927

Values of the thermodynamic solubility product,  $K_{0_{s0}} = (S^0)^2$ , and the derived thermodynamic quantities were calculated by the compilers and are given in the following table.

		∆G <sup>0</sup>	$\Delta H^0$	$\Delta S^0$
t/ºC	104K0 <sub>80</sub>	kJ mol-1	kJ mol-1	J mol-1 K-1
25	2.89	20.20	19.14	-3.6
30	3.28	20.22	19.14	-3.6
35	3.71	20.24	19.14	-3.6

Finally, the compilers calculated the solubility, S, of  $AgBrO_3$  in pure formamide in the absense of an inert electrolyte (i.e. no  $NaClO_4$ ) from the following equation:

$$log S = log S^0 + \frac{AS^{1/2}}{1+S^{1/2}} - BS$$
 [2]

Using the constants A and B in table above, the compilers used eq. [2] to compute the following solubilities in the binary AgBrO<sub>3</sub>-HCONH<sub>2</sub> system.

AgBrO3 soly (3	$5)  10^{*}K_{s0} = (5)^{*}$
t/°C mol dm-3	mol <sup>2</sup> dm <sup>-6</sup>
25 0.01861	3.46
30 0.01989	3.95
35 0.02126	4,52

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COMPONENTS:		ORIGINAL MEASUREMENTS:				
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Japandhanan Sa Kalidaa C				
(2) Methanol; CH4O; [67-56-1]		Janardhanan, S.; Kalidas, C.				
(3) Sulfinyl bis-methane (dimethyl sulfox [67-68-5]	ide); C <sub>2</sub> H <sub>6</sub> OS;	Z. Naturforsch., T. A. Physik., Phys. Chem., Kosmophys. <u>1984</u> , 39A, 600-2.				
VARIABLES:		PREPARED BY:				
Solvent composition T/K = 303.15		H. Miyamoto				
EXPERIMENTAL DATA		L				
LAI LAMALATAL DATA.						
(CH <sub>3</sub> ) <sub>2</sub> SO	(CH <sub>3</sub> ) <sub>2</sub> SO		AgBrO <sub>3</sub> soly			
mole fraction	mass %ª	¢	10 <sup>2</sup> mol kg <sup>-1</sup>			
0	0	31.80	0.005			
0.1	21.3	35.75	0.024			
0.2	37.9	38.80	0.079			
0.3	51.1	41.60	0.186			
0.4	61.9	44.00	0.362			
0.5	70.9	45.20	0.640			
0.6	78.5	46.01	1.00			
0.7	85.1	46 45	1.54			
0.8	90.7	46.60	2 20			
0.9	95.6	46.45	3.03			
10	100	46.00	3 79			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:				
Solubilities were determined by a potentic method as in (1). See the compilation of AgIO <sub>3</sub> -(CH <sub>3</sub> ) <sub>2</sub> SO-CH <sub>3</sub> OH system for deta method.	ometric the ils on this	AgBrO <sub>3</sub> prepd as in (1): i.e. by reaction of AgNO <sub>3</sub> with KBrO <sub>3</sub> . The ppt was thoroughly washed with water and then with acetone, and dried in vacuum for several hours at 70-80°C. Purity was checked by potentiometric determination of silver content. (CH <sub>3</sub> ) <sub>2</sub> SO (BDH,				
Thermodynamic solubility product constant using the extended Debye-Hückel equation size parameter of 0.65 nm, but not report original paper. The authors use these K0 calculate Gibbs energies of transfer from the CH <sub>3</sub> OH-(CH <sub>3</sub> ) <sub>2</sub> SO mixed solvents. Va $\Delta G^{0}_{t}(AgBrO_{3})$ are given in the paper.	nts calculated on with an ion ed in the on values to CH <sub>3</sub> OH to alues of	LR) purified as in (2): i.e. by heating over molecular sieves for 2 h at 90°C followed by flash distillation under vac. CH <sub>3</sub> OH (BDH, LR) purified as in (2): i.e. by refluxing over neutral alumina followed by distillation, and drying over K <sub>2</sub> SO <sub>4</sub> followed by fractional distillation.				
Dielectric constants, $\epsilon$ of the solvent mixtures at 30°C were measured, and are given in the data table above.		ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.1 K.				
		REFERENCES: 1. Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn <u>1980</u> , 53, 2363.				
		2. Janardhanan, S.; Kalidas, C. Proc. Indian Acad. Sci. <u>1981</u> , 90, 89.				

COMPONENTS:	ORIGINAL MEASUREMENTS:
(2) N,N-Dimethylformamide; $C_{3}H_{7}NO$ ; [68-12-2]	Giridhar, V. V.; Kalidas, C.
(3) Methanol; CH4O; [67-56-1]	Indian J. Chem. <u>1983</u> , 22A, 224-6.
VARIABLES: Solvent composition T/K = 303.15	PREPARED BY: H. Miyamoto
EXPERIMENTAL DATA:	

HCON(CH <sub>3</sub> ) <sub>2</sub> mole fraction	HCON(CH <sub>3</sub> ) <sub>2</sub> mass %ª	AgBrO <sub>3</sub> soly 104mol kg <sup>-1</sup>
0	0	0.5
0.1	20	1.23
0.2	36	1.52
0.3	49	1.90
0.4	60	2.03
0.5	70	2.26
0.6	77	2.36
0.7	84	2.60
0.8	90	2.70
0.9	95	2.84
1.0	100	2.05
1.0	100	2.05

<sup>a</sup>Mass % calculated by the compiler.

#### **AUXILIARY INFORMATION**

#### METHOD/APPARATUS/PROCEDURE:

Solubilities were determined as in (1): i.e. probably a potentiometric method. See the compilation of the AgIO<sub>3</sub>-(CH<sub>3</sub>)<sub>2</sub>SO-CH<sub>3</sub>OH system for details on this method.

Thermodynamic solubility product constants calculated using the extended Debye-Hückel equation with an ion size parameter of 0.65 nm, but not reported in the original paper. The authors use these  $K_{0,0}^0$  values to calculate Gibbs energies of transfer from CH<sub>3</sub>OH to the CH<sub>3</sub>OH-HCON(CH<sub>3</sub>)<sub>2</sub> mixed solvents. Values of  $\Delta G_{0,1}^0(AgBrO_3)$  are given in the paper.

#### SOURCE AND PURITY OF MATERIALS:

AgBrO<sub>3</sub> prepd as in (1): i.e. by reaction of AgNO<sub>3</sub> with KBrO<sub>3</sub>. The ppt was thoroughly washed with water and then with acetone, and dried in vacuum for several hours at 70-80°C. Purity was checked by potentiometric determination of silver content. HCON(CH<sub>3</sub>)<sub>2</sub> (BDH, LR) dist, dried over anhydr CuSO<sub>4</sub> for one week, and redistilled under reduced pressure. The product had a b.p. of 15°C at 15 mm Hg, and at 25°C had a density of 0.9441 g cm<sup>-3</sup>, n<sub>D</sub> = 1.4268, and an electrolytic conductance of 1.05 x 10<sup>-7</sup> S cm<sup>-1</sup>. CH<sub>3</sub>OH dried with anhydr Na<sub>2</sub>SO<sub>4</sub>, distilled, refluxed over neutral alumina and fractioning: the middle fraction was saved. The product had a b.p. of 64.6°C, and at 20°C, d = 0.7914 g cm<sup>-3</sup>, and n<sub>D</sub> = 1.3286.

# ESTIMATED ERROR:

Soly: nothing specified. Temp: precision  $\pm 0.1$  K.

#### **REFERENCES:**

 Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn. <u>1980</u>, 53, 2363.
COMPONENTS:		ORIGINAL MEASUREMENTS:			
(1) Silver bromate; AgBrO <sub>3</sub> ; [7783-89-3]		Subramarian S. Kalidas C			
(2) Methanol; CH <sub>4</sub> O; [67-56	5-1]		,	·, •	
(3) Acetonitrile: C-H-N: 17	5-05-81		Electrochim. Ac	ta <u>1984</u> , 29, 753-6.	
(b) Accionini, C211314, [7.					
VARIABLES:			PREPARED BY:		
T/K = 303.15			H. Miyamoto		
EXPERIMENTAL DATA:			L		
C	H3CN	CH3CN		AgBrO <sub>3</sub> soly	
mole	fraction	mass %ª	£	10 <sup>3</sup> mol kg <sup>-1</sup>	
^		0	21.0	0.009	
0	1	12	31.8	0.098	
0	.1	12	32.3	1.935	
0	2	24	32.0	4.37	
0		35 46	33.0	8 30	
0	.4	56	33.5	0.18	
0		50 66	34.0	9.10	
ů N		75	34.3	8 39	
ů	• <b>8</b>	84	34.8	6.49	
0	.9	92	35.0	4.08	
1	.0	100	35.5	1.87	
AUXILIARY IN		FORMATION			
METHOD/APPARATUS/P	ROCEDURE:		SOURCE AND I	URITY OF MATERIALS:	
Method from (1). About 2:	5 ml of solvent n	nixture and	AgBrO3 prepd by	$\gamma$ reaction of aq slns of AgNO <sub>3</sub> and	
excess AgBrO <sub>3</sub> stirred in a	thermostated ves	sel for	KBrO <sub>3</sub> . The pp	was filtered, washed with water and	
about 12 hours. Aliquots of	f saturated soluti	on filtered	then with alcoho	I, and dried over $P_2O_5$ in vacuum at	
through a glass filter and an	nalyzed for iodat	e. A	80°C to const weight. Purity was checked by potentio-		
defined quantity of excess l	KI solution added	1 to a	metric determina	tion of silver. CH <sub>3</sub> CN (BDH, LR)	
weighed aliquot, and the ex	cess KI back-titi	rated	distd, dried over anhydr $K_2CO_3$ , and redistd from a		
potentiometrically with stan	idard AgnO3 son	ition using	few crystals of AgNO <sub>3</sub> . The product had a b.p. of 80.0 $\pm$ 0.22(C = and 2 = 0.01 (DDH)		
a Metronm Multidosimate (	E415) Durer. All	solubility	$\pm$ 0.1°C, and at 25°, d = 0.7766 g cm <sup>-3</sup> . CH <sub>3</sub> OH (BDH,		
determinations were carried	out least twice,	and the	LR) was distd, dried over anhydr $Na_2SO_4$ , and redistd		
agreement was better than a	E I %0.		from Mg turning	2500 d = 0.7867 g cm <sup>-3</sup>	
			collected, and at	$25^{\circ}$ C, $\alpha = 0.7867$ g cm <sup>-3</sup> .	
Dielectric constants, $\epsilon$ of the solvent mixtures at 30°C		ESTIMATED ERROR:			
were measured, and are giv	en in the data ta	ble above.	Soly: precision be	etter than ± 1 %.	
			Temp: nothing specified.		
			REFERENCES:		
			I. Kalidas, C.; So	chneider, H. Z. Phys. Chem. <u>1980</u> ,	
			120, 145.		

		Silver B	romate		163
COMPONENTS:			ORIGINAL MEA	SUREMENTS:	
(1) Silver bromate; AgBrO <sub>3</sub> ;	[7783-89-3]		Subramarian S.	Kalidas C	
(2) Ethanol; C <sub>2</sub> H <sub>6</sub> O; [64-17-5	5]		Dutianui ani, an	, Kandas, C.	
(3) Acetonitrile; C <sub>2</sub> H <sub>3</sub> N; [75-	05-8]		Electrochim. Ac	ta <u>1984,</u> 29, 753-6.	
VARIABLES:			PREPARED BY:		
Solvent composition T/K = 303.15			H. Miyamoto		
EXPERIMENTAL DATA:		<u> </u>			
CH	3CN	CH3CN		AgBrO <sub>3</sub> soly	
mole f	raction	mass %ª	ć	10 <sup>3</sup> mol kg <sup>-1</sup>	
0		0	23.9	0.055	
0.1		9	25.1	0.406	
0.2	1	18	26.2	1.12	
0.3	,	28	27.4	1.96	
0.4	•	37	28.6	2.83	
0.5	i	47	29.6	3.63	
0.6	i	57	30.9	4.28	
0.7		68	32.1	4.64	
0.8		78	33.3	4.37	
0.9	,	89	34.5	3.56	
1.0	ł	100	35.5	1.87	
	A	UXILIARY IN	FORMATION		
METHOD/APPARATUS/PROCEDURE:		SOURCE AND P	URITY OF MATERIALS:		
Method from (1). About 25 ml of solvent mixture and excess AgBrO <sub>3</sub> stirred in a thermostated vessel for about 12 hours. Aliquots of saturated solution filtered through a glass filter and analyzed for iodate. A defined quantity of excess KI solution added to a weighed aliquot, and the excess KI back-titrated potentiometrically with standard AgNO <sub>3</sub> solution using a Metrohm Multidosimate (E415) buret. All solubility determinations were carried out at least twice, and the agreement was better than $\pm 1$ %. Dielectric constants, $\epsilon$ of the solvent mixtures at 30°C		AgBrO <sub>3</sub> prepd by reaction of aq slns of AgNO <sub>3</sub> and KBrO <sub>3</sub> . The ppt was filtered, washed with water and then with alcohol, and dried over $P_2O_5$ in vacuum at 80°C to const weight. Purity was checked by potentio- metric determination of silver. CH <sub>3</sub> CN (BDH, LR) distd, dried over anhydr K <sub>2</sub> CO <sub>3</sub> , and redistd from a few crystals of AgNO <sub>3</sub> . The product had a b.p. of 80.0 $\pm$ 0.1°C, and at 25°, d = 0.7766 g cm <sup>-3</sup> . CH <sub>3</sub> CH <sub>2</sub> OH (BDH, LR) was distilled from magnesium and iodine as recommended in (2).		nd and n at entio- .R) n a of 80.0 OH dine as	
were measured, and are given in the data table above.		Soly: precision be Temp: nothing sp	etter than ± 1 %. Decified.		
			REFERENCES: 1. Kalidas, C.; Sc 120, 145.	chneider, H. Z. Phys. Chem. <u>19</u>	<u>80</u> ,

2. Vogel, A.I. Practical Organic Chemistry. 3rd ed., Longmans, London, <u>1975</u>: page 167.

104	Silver louate		
COMPONENTS:	EVALUATORS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University)		
(2) Water; H <sub>2</sub> O; [7732-18-5]	M. Salomon (US Army ETDL) September 1989		

Silver Indete

### **CRITICAL EVALUATION:**

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#### THE BINARY SYSTEM

Data for the solubility of silver iodate in pure water have been reported in 21 publications (1-21). In eight of these publications (1, 8, 11, 12, 18-21) the solubilities were reported in units of mol kg<sup>-1</sup>, and in 16 publications (1 - 10, 12 - 17) the solubilities were reported in units of mol dm<sup>-3</sup>. There are no indications of the existence of any hydrates. Experimentally, the solubilities in binary and multicomponent systems are all based on isothermal methods with varying analytical procedures: the gravimetric method (1, 2, 5, 29), conductometric method (3, 4), potentiometric method (18, 19, 22 - 24, 24, 32), colorimetric method (6), volumetric (iodometric) methods (7 - 17, 20, 28, 30, 31, 34), and radioassay methods (26, 33).

### Data at 298.15 K

The solubility data for  $AgIO_3$  at 298.15 K are summarized in Table 1. The solubility value of  $1.793 \times 10^{-4}$  mol dm<sup>-3</sup> for  $AgIO_3$  in an aqueous solution containing  $1 \times 10^{-4}$  mol dm<sup>-3</sup> HClO<sub>4</sub> (26) is not included in Table 1.

Table 1. Experimental solubilities in the binary AgIO<sub>3</sub>-H<sub>2</sub>O system at 298.15 K (mol dm<sup>-3</sup> units)

number of	
measurements	reference
1	1
17	8
extrapolated	12
2	5
1	13
3	10
6	14
10	2
3	15 - 17
	number of measurements 1 17 extrapolated 2 1 3 6 10 3

\*Rejected data points.

<sup>b</sup>See the compilation of this paper indicating that there might be some confusion as to the true units of these three solubility values.

The average value for the solubility of  $AgIO_3$  at 298.15 K for the 30 acceptable independent measurements listed in Table 1 is  $1.774 \times 10^{-4} (\pm 0.007 \times 10^{-4})$  mol dm<sup>-3</sup>, and this is designated as the recommended solubility at 298.15 K. In deriving this recommended value, those solubility values which differed by more than two times the standard deviation ( $\sigma$ ) were rejected, and the uncertainty is based on a Student's t analysis for the 98 % confidence level (for the 30 acceptable data points in Table 1, Student's t = 2.462 for 29 degrees of freedom, the standard deviation is 0.0155, and the standard deviation of the mean is 0.0028). The standard deviation is defined in the usual manner as

$$\sigma^{2} = \frac{\sum_{i=1}^{N} (c_{i} - \bar{c})^{2}}{N - 1}$$
[1]

The standard deviation of the mean is defined as  $\sigma_m = \sigma/\sqrt{N}$  and the uncertainty is therefore calculated from  $t\sigma_m$ .

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Water; H <sub>2</sub> O; [7732-18-5]		EVALUATORS: H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University) M. Salomon (US Army ETDL)		
CRITICAL EVALUA	TION:			
Data at other temper	atures			
	Table 2. Experimental solut	bilities as a function of temperature		
T/K	$10^4c_1/\text{mol dm}^{-3a}$	$10^4 m_1 / \text{mol kg}^{-1a}$	reference	
282.58	0.97		4	
283.2	0.97 (3)		9	
291.2	1.36		4	
291.5	1.38		4	
293.1	1.52 <sup>b</sup> (17)		3	
293.2	1.38 <sup>b</sup>		6	
293.2	1.463 (3)		9	
298.2	1.27 <sup>b</sup>	1.28 <sup>b</sup>	1	
298.2	1.746	1.754	12	
298.2	1.764 (17)		8	
298.2	1.78 (2)		5	
298.2	1.78		13	
298.2	1.785 (3)		9,10	
298.2	1.80 (6)		14	
298.2	1.89 <sup>b</sup>		2	
298.2	1.92 <sup>b</sup>		15-17	
298.2		1.794	11	
298.2		1.8	20	
299.8	1.91		4	
303.2	2.152 (3)		9,10	
303.2		2.34	19	
303.2		3.22ь	21	
303.2		3.3 <sup>b</sup>	18	
308.2	2.587 (3)		9,10	
308.2	2.65		15	
308.2	2.66		16	
318.2	3.52		14	

<sup>a</sup>When specificially stated by the authors, the numbers of independent solubility measurements are given in parenthesis.

348.2

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<sup>b</sup>Rejected data points on the basis that the difference between observed and calculated solubilities exceeded 2 $\sigma$ .

8.40 (25)

7

The solubility data for  $AgIO_3$  for various temperatures are given in Table 2 in which 17 acceptable data points are indicated. Assigning equal weights to all 17 data points, the following smoothing equation was obtained by the method of relative least squares

 $\ln(c_1/\text{mol dm}^{-3}) = -1838.31 + 2477.69/(T/100\text{K}) + 1683.72 \ln(T/100\text{K}) - 281.966(T/100\text{K})$  [2]

The standard error of estimate for the calculated - observed solubilities from eq. [2] is  $\sigma = 2.3 \times 10^{-6}$ .

100	Silver		r lodate	
COMPONENTS:		EVA	EVALUATORS:	
<ol> <li>(1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3]</li> <li>(2) Water; H<sub>2</sub>O; [7732-18-5]</li> </ol>		H. E.N M. Ser	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University) M. Salomon (US Army ETDL) September 1989	
CRITICAL EVALUAT	ION:		······································	
Table 3.	Tentative sol	ubilities calculated from g thermodynamic solubi	the smoothing equation <sup>a</sup> and lity products	
	T/K	10 <sup>4</sup> c <sub>1</sub> /mol dm <sup>-3</sup>	$10^8 K_{s0}/mol^2 dm^{-6c}$	
	283.2	0.985	0.961	
	288.2	1.119	1.406	
	293.2	1.457	2.097	
	298.2	1.786 <sup>b</sup>	3.147 <sup>d</sup>	
	303.2	2.175	4.661	
	308.2	2.613	6.716	
	313.2	3.079	9.311	
	318.2	3.534	12.248	

eThermodynamic solubility product (see description below).

<sup>d</sup>The recommended thermodynamic solubility product using the recommended solubility of  $1.774 \times 10^{-4}$  mol dm<sup>-3</sup> is 3.105 x 10<sup>-8</sup> mol<sup>2</sup> dm<sup>-6</sup>.

Table 3 contains the results for tentative thermodynamic solublity products,  $K_{n0}$ , calculated from

$$K_{s0} = c_1^2 \gamma_*^2$$
 [3]

where the mean molar activity coefficients ( $\gamma_{\pm}$ ) were calculated from the Davies equation (36) using the dielectric constants ( $\epsilon$ ) tabulated by Robinson and Stokes (37):

$$-\ln \gamma_{\star} = \frac{1.8246 \times 10^6}{(\epsilon T)^{3/2}} \left( \frac{c_1^{1/2}}{1 + c_1^{1/2}} - 0.3 c_1 \right)$$
 [4]

The smoothed solubilities given in Table 3 are designated as tentative solubilities on the basis that there is a small difference between the smoothed solubility of 1.786 x 10<sup>-4</sup> mol dm<sup>-3</sup> and the recommended value of 1.774 x 10<sup>-4</sup> mol dm<sup>-3</sup> obtained from the weighted average method discussed above. Of the four e.m.f. studies (22, 23, 27 and 38) which employ cells with liquid junctions to determine the solubility product, only the data of Kolthoff and Chantooni are close to the tentative value at 298.2 K given in Table 3. The  $K_{s0}$  values of ~7 x 10-8 mol<sup>2</sup> dm<sup>-6</sup>, 1.096 x 10<sup>-8</sup> mol<sup>2</sup> dm<sup>-6</sup> and 1.122 x 10<sup>-8</sup> mol<sup>2</sup> dm<sup>-6</sup> at 298.2 K from references 22, 23 and 38 are obviously in error and must be rejected (note that the data from reference 38 was not compiled). Using the  $K_{s0}$  data in Table 3 except for 298.2 K for which we use the recommended solubility product, standard thermodynamic quantities were computed for the reaction  $AgIO_{s}(s) \Leftrightarrow Ag^{+}(sin) + IO_{s}^{-}(sin)$  by the least squares method resulting in

$$\ln\left(\frac{K_{s0}}{K_{s0}(298)}\right) = 22.4613 - \frac{6695.889}{T/K}$$
[5]

For this relation, the standard deviations of the intercept and slope are, respectively, 0.26 and 76.6, and for the correlation coefficient,  $r^2 = 0.9991$ . The enthalpy calculated from -R(slope) =  $\Delta H_{sln} = 55.67$  kJ mol<sup>-1</sup>, and at 298.2 K the entropy  $\Delta S_{sin} = 42.96 \text{ J K}^{-1} \text{ mol}^{-1}$ . These thermodynamic quantities are designated as tentative values.

COMPONENTS:	EVALUATORS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University)
(2) Water; H <sub>2</sub> O; [7732-18-5]	M. Salomon (US Army ETDL) September 1989

### **CRITICAL EVALUATION:**

For solubilities in mol  $kg^{-1}$  units, the data in Table 2 are taken as tentative values. Standard thermodynamic quantities based on these units can be computed from tabulated density values and the data given in Table 3.

The solubilities reported by Ramette (26) in 99.5+ %  $D_2O$  containing 1 x 10<sup>-4</sup> mol dm<sup>-3</sup> HCiO<sub>4</sub> are given in the compilations and these data are designated as tentative.

#### **TERNARY SYSTEMS**

#### Systems With One Saturating Component

The solubility of  $Ag(IO_3)$  in KNO<sub>3</sub> solutions has been reported in four publications (7-9, 12). Li and Lo (9) studied the solubilities at 283 K, 293 K, 298 K, 303 K and 308 K, and Baxter (7) employed the single temperature of 348 K. All other studies were carried out at 298 K. Derr et al. (12) reported only graphical data along with smoothing equations for the solubility as a function of ionic strength (mol kg<sup>-1</sup> units), and these smoothing equations can be found in the compilation of this study. The solubility data based on mol dm<sup>-3</sup> units at 298 K from references (8 and 9) are given in Table 4 below.

Table 4. Experimental solubilities of AgIO<sub>3</sub> as a function of KNO<sub>3</sub> concentration at 298.2 K

KNO <sub>3</sub> concn	AgIO <sub>3</sub> soly	
mol dm <sup>-3</sup>	104mol dm-3	reference
0	1.774ª	
0.001301	1.823	8
0.001301	1.827	9
0.003252	1.870	8
0.003252	1.868	9
0.006503	1.914	8
0.006503	1.913	9
0.01410	1.994	8
0.01410	2.002	9
0.07050	2.301	8
0.07050	2.304	9
0.1213	2.454	9
0.1998	2.665	8
0.2528	2,793	9
0.4995	3.314	8
0.5050	3.330	9
0.8738	3.904	9
0.9989	4.086	8

<sup>a</sup>Recommended solubility in pure water.

The agreement between these two studies of (8 and 9) appear to be excellent, and where solubilities are reported at the same concentration of  $KNO_3$ , the average value can be taken as the recommended solubility. Over the entire range of 0 - 1 mol dm<sup>-3</sup>  $KNO_3$ , the data were fitted by the relative least squares method to the following simple smoothing equation:

$$c_1 = 1.764 \cdot 10^{-4} + 1.87590 \cdot 10^{-4} c_2^{1/2} + 3.60711 \cdot 10^{-5} c_2 + 9.24915 \cdot 10^{-6} c_2^{1.5}$$
 [6]

The standard deviation for the solubility  $c_1$  is 1.0 x 10<sup>-6</sup> which leads the evaluators to propose that solubilities calculated from this smoothing equation are precise to three significant figures and are therefore designated as tentative solubilities.

168	Silver lodate	
COMPONENTS:	EVALUATORS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University)	
(2) Water; H <sub>2</sub> O; [7732-18-5]	M. Salomon (US Army ETDL) September 1989	

# **CRITICAL EVALUATION:**

Systems With One Saturating Component, continued.

The solubility of  $Ag(IO_3)$  in solutions containing salts other than  $KNO_3$  has been reported in five publications (7, 8, 14, 25, 30). Baxter (7) studied the solubility in solutions of potassium perchlorate, and in aqueous sulfate solutions of potassium, magnesium and barium at 348.2 K. Both Baxter (7) and Kolthoff and Lingane (8) reported solubilities in barium nitrate solutions at 348.2 K and 298.2 K, respectively, and Kolthoff and Lingane also studied the  $AgIO_3$ -TINO\_3-H<sub>2</sub>O system at 298.2 K. Shchigol (30) reported solubilities in aqueous solutions of KIO<sub>3</sub> at ~293 K to ~295 K, and Ricci and Amron (14) studied solubilities in aqueous  $AgNO_3$  solutions at 298.2 K. Rainier and Martin (25) reported solubilities in solutions containing lithium iodate at temperatures of 298.2, 308.2, and 323.2 K.

# Solubility in Acids and Bases

The solubility of  $AgIO_3$  in nitric acid solutions has been reported by Longi (1), Hill and Simmons (5) and by Li and Lo (10). For HNO<sub>3</sub> concentrations above 8 mol dm<sup>-3</sup>, Hill and Simmons state that there is iodate decomposition, and Li and Lo stated that even at nitric acid concentrations below 1 mol dm<sup>-3</sup>, the increasing solubility of  $AgIO_3$  as the HNO<sub>3</sub> concentration increases is due to incomplete dissociation of iodic acid formed by double decomposition between silver iodate and nitric acid. In fact the evaluators had difficulty in fitting these solubility data to a smoothing equation for nitric acid concentrations greater than 2 mol dm<sup>-3</sup> (see below). The experimental solubilities of  $AgIO_3$  in HNO<sub>3</sub> solutions at 298.2 K are given in Table 5 below.

Table 5. Experimental solubilities of AgIO<sub>3</sub> as a function of HNO<sub>3</sub> concentration at 298.2 K

HNO <sub>3</sub> concn mol dm <sup>-3</sup>	AgIO <sub>s</sub> soly 10 <sup>3</sup> mol dm <sup>-3</sup>	reference
0	0.1774	
0.001301	0.18297	10p
0.006503	0.1949	10
0.01410	0.2070	10
0.07050	0.2660	10
0.1213	0.3040	10
0.125	0.304	5°
0.250	0.379	5
0.2528	0.3828	10
0.500	0.499	5
0.5050	0.5027	10
0.8738	0.6522	10
1.00	0.731	5
2.00	1.174	5
4.00	2.469	5
6.72	4.113	1
8.00	5.608	5

<sup>a</sup>Recommended solubility. <sup>b</sup>Data from reference 10 are averages from three determinations. <sup>c</sup>Data from reference 5 are averages from two determinations from under- and supersaturation.

The evaluators could not obtain a satisfactory fit to an empirical smoothing equation using all 16 data points in Table 5. We were able to obtain a satisfactory fit to the thirteen most dilute data points omitting the solubility of  $0.6522 \times 10^{-4}$  mol dm<sup>-3</sup> in aqueous HNO<sub>3</sub> solution of 0.8738 mol dm<sup>-3</sup> (rejected data point from ref. 10). The necessity of rejecting this data point is clearly seen in the figure on the top of the following page, and based on the remaining data points for HNO<sub>3</sub> concentrations up to 2.0 mol dm<sup>-3</sup>, the following smoothing equation was obtained by the relative least squares method:



Ternary Systems with Two Saturating Components

Shklovskaya, Arkhipov, Kidyarov, Vdovkina and Poleva (20) studied the  $AgIO_3-LiIO_3-H_2O$  system by the isothermal method at 298.2 K. The compilation of this paper can be found in Volume 30 of the IUPAC Solubility Data Series (35). The system is characterized by the formation of a series of solid solutions involving polymorphic LiIO<sub>3</sub> and  $\alpha$ -LiIO<sub>3</sub>, and details on the solid phases of LiIO<sub>3</sub> can also be found in (35).

subsequent publication on the quaternary AgIO<sub>3</sub>-NH<sub>4</sub>NO<sub>3</sub>-NH<sub>4</sub>(aq)-H<sub>2</sub>O system, Vosburgh and McClure (28)

reported a formation constant of 2.5 x 10<sup>4</sup> mol dm<sup>-3</sup> for the Ag(NH<sub>3</sub>)<sup>+</sup> complex.

170	Bilver lodate
COMPONENTS:	EVALUATORS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University)
(2) Organic solvents	M. Salomon (US Army ETDL) September 1989
(3) Water; H <sub>2</sub> O; [7732-18-5]	

Silver Indate

CRITICAL EVALUATION:

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Ternary Systems with Two Saturating Components, continued

Ricci and Amron (14) studied the four systems given below, and in which the concentration of  $AgIO_3$  was not detected in solutions containing the second salt. Even qualitative tests for silver in these solutions were negative. In contrast to these studies, it should be noted that Shklovskaya et al. (20) were able to detect  $AgIO_3$  in LiIO<sub>3</sub> solutions: e.g. for LiIO<sub>3</sub> concentrations of 7 to 43 mass %,  $AgIO_3$  solubilities ranging from 0.00012 to 0.00047 mass % were reported with varying solid phase composition (see previous page).

 $\begin{array}{l} AgIO_3 - LiIO_3 - H_2O\\ AgIO_3 - NaIO_3 - H_2O\\ AgIO_3 - KIO_3 - H_2O\\ AgIO_3 - NH_4IO_3 - H_2O \end{array}$ 

### QUATERNARY AND QUINTERNARY SYSTEMS

While there are insufficient data to allow for comparisons and data evaluation, it is noted that in all studies on quaternary (12, 25, 28 29) and quinternary (29, 33, 34) systems,  $AgIO_3$  is the only saturating component.

### SOLUBILITIES IN AQUEOUS-ORGANIC MIXTURES

The solubility of  $AgIO_3$  in aqueous-organic mixtures has been reported in 11 publications (11, 15-19, 21, 23, 24, 31, 32). The study by Dash et al. (32) actually does not involve the determination of solubilities, but employs standard half-cell e.m.f. data to compute thermodynamic solubility products in 1,4-dioxane - water mixtures at temperatures of 278K, 283 K, 288 K, 293 K and 298 K. Similarly, for glycerol-water mixtures (23) and urea-water mixtures (24), no solubility data were measured, but instead thermodynamic solubility products were computed from standard half-cell e.m.f. values.

Keefer and Reiber (11) determined solubilities in aqueous glycine and alanine solutions and found increasing solubilities for increasing amino acid concentration. The slope of the plot of *log* (solubility) as a function of amino acid concentration was found to be abnormal and explained by assuming complexation between silver and glycinate or alanate ions.

Solubilities in pryidine-water mixtures at 298 K (25) were interpreted in terms of  $AgPy^+$  and  $AgPy_2^+$  complexes. At 303 K (21), the solubility was found to reach a maximum in a solution contain 0.1 pyridine mole fraction, and these data interpreted in terms of preferencial solvation of silver ions by pyridine and preferential solvation of iodate ions by water. Vosburg and Cogswell (25) used a maximum of ~0.03 pyridine mole fraction and the existence of the solubility maximum was therefore not observed by these authors.

Miyamoto and co-workers determined the solubility of  $AgIO_3$  in ethylene carbonate-water mixtures (15), 2-methoxyethanol-water mixtures (16), and tetrahydrofuran-water mixtures (17). Jannardhana and Kalidas (18) determined the solubility of  $AgIO_3$  in dimethyl sulfoxide-water mixtures, and a common feature in all four of these systems is the monotonic decrease in solubility as the concentration of the organic component increases: i.e. no maxima or minima were observed.

Subramanian, Rao and Kalidas (19) determined the solubility of  $AgIO_3$  in acetonitrile-water mixtures and again find a maximum at an acetonitrile concentration of 0.1 mole fraction. These results were interpreted in terms of selective solvation similar to those in the pyridine-water mixtures discussed above.

#### **COMPONENTS:**

(1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3]

(2) Water; H<sub>2</sub>O; [7732-18-5]

### **EVALUATORS:**

H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University) M. Salomon (US Army ETDL) September 1989

**CRITICAL EVALUATION:** 

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1	7	2
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# Silver lodate

COMPONENTS:	EVALUATORS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	H. Miyamoto (Niigata University) E.M. Woolley (Brigham Young University)
(2) Water; H <sub>2</sub> O; [7732-18-5]	M. Salomon (US Army ETDL) September 1989

**CRITICAL EVALUATION:** 

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# COMPONENTS:

(1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3]

(2) Organic Solvents

### **EVALUATORS:**

H. Miyamoto (Niigata University) M. Salomon (US Army ETDL) September 1989

# CRITICAL EVALUATION:

# SOLUBILITIES IN NONAQUEOUS MEDIA

The solubility of  $AgIO_3$  in both protic and aprotic organic solvents was reported in nine independent studies (1-9) which are briefly reviewed below. Complete details can be found in the compilations.

Kolthoff and Chantooni (1) determined the solubility of  $AgIO_3$  in pure methanol containing  $(C_2H_5)_4NCI$  and  $(C_2H_5)_4NIO_3$  (see compilation for numerical values) at 298 K. From these solubilities they calculate a solubility product of 2.0 x 10<sup>-13</sup> mol<sup>2</sup> dm<sup>-6</sup> for AgIO<sub>3</sub>. This same paper reports the determination of the concentration solubility product,  $K_{s0}$ , by the e.m.f. method, and from two data points an average value of 2.7 x 10<sup>-13</sup> mol<sup>2</sup> dm<sup>-6</sup> was calculated. A subsequent study at 298.2 K by Kalidas and Schneider (3) employed the e.m.f. to determine solubilities which in turn yielded a value of 1.16 x 10<sup>-11</sup> mol<sup>2</sup> dm<sup>-3</sup> for the concentration solubility product  $K_{s0}$ . According to Subramanian and Kalidas (9), these large differences in  $K_{s0}$  values may, presumably, be attributed to irreversible behavior of the Ag,AgIO<sub>3</sub> electrode used by Kolthoff and Chantooni. At 303 K, Kalidas et al. (2, 9) used the e.m.f. method to determine solubilities in pure methanol and report the identical value of 1.92 x 10<sup>-11</sup> mol<sup>2</sup> kg<sup>-2</sup> for the concentration solubility product.

For the solubility of AgIO<sub>3</sub> in pure acetonitrile, Kolthoff and Chantooni (1) report an average value (2 data points) of 2.3 x  $10^{-11}$  mol<sup>2</sup> dm<sup>-6</sup> for  $K_{s0}$  at 298 K. At 303 K, Kalidas et al. report concentration solubility product constants of 3.8 x  $10^{-9}$  mol<sup>2</sup> kg<sup>-2</sup> (calculated by the evaluators), and 4.17 x  $10^{-10}$  mol<sup>2</sup> kg<sup>-2</sup> in (5 and 9), respectively.

Similar disagreement can be found for  $K_{s0}$  values in references (1, 2 and 4): 1.6 x 10<sup>-10</sup> mol<sup>2</sup> dm<sup>-6</sup>, 8.53 x 10<sup>-11</sup> mol<sup>2</sup> kg<sup>-2</sup> and 6.4 x 10<sup>-11</sup> mol<sup>2</sup> kg<sup>-2</sup>, repectively (the latter value calculated by the evaluators from the solubility data in the compilation).

### REFERENCES

- 1. Kolthoff, I.M.; Chantooni, M.K. J. Phys. Chem. 1973, 77, 523.
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- 4. Janardhanan, S.; Kalidas, C. Bull. Chem. Soc. Jpn. <u>1980</u>, 53, 2363.
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- 6. Nyak, B.; Dash, U.N. Thermochim. Acta 1973, 6, 223.
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- 8. Palanivel, A.; Rajendran, G.; Kalidas, C. Ber. Bunsen. Ges. Phys. Chem. 1986, 90, 794.
- 9. Subramanian, S.; Kalidas, C. Fluid Phase Equil. 1987, 32, 205.

1/4 Silver	ISadte		
COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Noyes, A.A.; Kohr, D.A.		
(2) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1902</u> , 24, 1141-8.		
VARIABLES:	PREPARED BY:		
T/K = 298	H. Miyamoto		
EXPERIMENTAL DATA:			
solubility from undersaturation	solubility from supersaturation		
g AgIO <sub>3</sub> in	g AgIO3 in		
250 cm <sup>3</sup> sln 10 <sup>4</sup> mol dm <sup>-3a</sup>	$250 \text{ cm}^3 \text{ sin}$ $10^4 \text{mol dm}^{-3a}$		
0.0109 1.86	0.0112 1.91		
0.0107 1.82	0.0113 1.93		
0.0112 1.91	0.0117 1.99		
0.0108 1.84	0.0106 1.81		
0.0111 1.89	0.0114 1.94		
averages: 0.0109, 1.86	verages: 0.0112, 1.92		
AUXILIARY IN	NFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
AgIO <sub>3</sub> and pure water were rotated in a thermostat at $25^{\circ}$ C for 4 or 5 hours. Saturation was approached from both undersaturation and from supersaturation. After allowing the solid particles to settle for a short time, the solutions were filtered by suction. AgI was precipitated from the saturated solutions by addition of KI. The precipitate was collected in a platinum Gooch crucible upon a layer of finely divided Pt, dried at 160°C, and weighed.	AgIO <sub>3</sub> was precipitated from solutions of (recrystal- lized) Ag <sub>2</sub> SO <sub>4</sub> and KIO <sub>3</sub> . The precipitate was washed with hot water.		
	ESTIMATED ERROR: Soly: standard deviation about 4 %. Temp: nothing specified. REFERENCES:		

Silver Iodate					
COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL MEASUREMENTS: Böttger, W. Z. Phys. Chem. <u>1903</u> , 46, 521-619.		
<b>VARIABLES:</b> T/K = 293.1			PREPARED BY: H. Miyamoto and E.M. Woolley		
EXPERIMENT	AL DATA:				
t/ºC	equilibration time (hours)	κ(sin) 10 <sup>6</sup> S cm <sup>-1</sup>	κ(water) 10 <sup>6</sup> S cm <sup>-1</sup>		
19.96	36	14.14	0.770		
19.96	69	14.09	0.770		
19.96	67	14.11	0.770		
19.94	15	14.06	1.18		
19.94	5	13.91	1.18		
19.94	87	13.88	1.18		
19.94	7	14.02	1.18		
19.94	8	14.00	1.18		
19.94	34	14.15	1.06		
19.94	43	14.12	1.06		
19.94	37	14.11	1.06		
19.95	26	14.36ª	1.32		
19.95	92	14.36ª	1.32		
19.95	36	14.38ª	1.32		
19.94	51	14.72ª	1.302		
19.94	42	14.31ª	1.27		
19.94	35	14.29ª	1.27		

<sup>a</sup>Average  $\kappa(\sin) = 1.405 \times 10^{-5} \text{ S cm}^{-1}$  not including these values. Using this average and molar conductances of 57.0 and 35.5 S cm<sup>2</sup> mol<sup>-1</sup> for  $\lambda^{\infty}$  for Ag<sup>+</sup> and IO<sub>3</sub><sup>-</sup>, respectively, the author computes a solubility of  $1.51_9 \times 10^{-4}$  mol dm<sup>-3</sup> from eqs. [1] and [2].  $K_{s0} = S^2 = 2.31 \times 10^{-8} \text{ mol}^2 \text{ dm}^{-6}$ .

 $\kappa(AgIO_3) = \kappa(sln) - \kappa(water)$ [1]

 $S = 1000 \kappa (AgIO_3) / \{\lambda^{\infty}(Ag^+) + \lambda^{\infty}(IO_3^-)\}$ [2]

#### **AUXILIARY INFORMATION**

# METHOD/APPARATUS/PROCEDURE:

SOURCE AND PURITY OF MATERIALS:

The solubility was determined by conductivity measurements. The condictivity cells which employed Pt electrodes were designed to prevent entrapment of air bubbles. After sealing, the entire cell was immersed in a water bath and rotated in the dark. Equilibrium was taken when the electrolytic conductivity was constant within experimental error (usually within 20 to 30 minutes). The bridge and the thermometer were calibrated, and the cell constants determined by using 0.010 mol dm<sup>-3</sup> KCl solution.

Analytically pure chemicals (Merck) were used.  $AgIO_3$ was precipitated from cold  $AgNO_3$  and  $KIO_3$  solutions. Part of the precipitate was washed several times in diffused daylight, and the residual parts were filtered off, dried, and stored. KCl was purified by precipitation from a saturated aqueous solution with alcohol. Laboratory distilled water was redistilled from a tin-plated still and stored in a flask fitted with a drying tube with NaOH and CaO.

ESTIMATED ERROR:  $\kappa$ : precision ± 1 x 10<sup>-6</sup> S cm<sup>-1</sup> (compilers). Soly: precision ± 20 % (compilers). Temp: accuracy ± 0.02 K.

176	Silver Iodate					
COMPONENTS:		ORIGINA	ORIGINAL MEASUREMENTS:			
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Sammet,	Sammet, V.			
(2) Water; H <sub>2</sub> O; [7732-18-5]		Z. Phys.	Z. Phys. Chem. <u>1905</u> , 53, 641-91.			
VARIABLES:			PREPARE	D BY:	*****	
T/K = 298 an	d 333 K		H. Miyan	noto and E.M. Woolley	Ŷ	
EXPERIMENT	FAL DATA:				<u> </u>	
Solubility proc	lucts were calculate	d from emf measurem	ents on the	following cell:		
	Ag   AgN	IO3(c1) ∥ KNO3(c1) ∥ KI	O <sub>3</sub> (c <sub>2</sub> )   AgI(	D <sub>3</sub> ,Ag [1]		
t∕⁰C	c <sub>1</sub> mol dm-3	c <sub>2</sub> mol dm- <sup>3</sup>	E <sub>1</sub> volts	108K <sub>s0</sub> a mol <sup>2</sup> dm <sup>-6</sup>	10 <sup>8</sup> K₅0 <sup>b</sup> mol² dm- <sup>6</sup>	
25	0.1	0.01	0.249	4.49	6.2	
	0.1	0.01	0.250	4.34	6.0	
	0.1	0.01	0.248	4.72	6.5	
	0.1	0.1	0.303	4.60	7.6	
	0.1	0.1	0.297	5.70	9.6	
	0.1	0.1	0.305	4.36	7.0	
60	0.1	0.01	0.214	42.94	58	
	0.1	0.01	0.213	44.00	60	
	0.1	0.01	0.213	44.00	60	
	0.1	0.1	0.279	40.70	60	
ļ	0.1	0.1	0.278	42.19	62	
Author's value Compilers' can	ues, evidently includ alculations for conc	ding activity coefficier entration solubility pro	its. iducts from	$ln \ \mathrm{K_{s0}} = -\mathrm{E_1F/RT} +$	ln(c1c2).	
		AUXILIARY I	NFORMATI	ON		
METHOD/AP	PARATUS/PROCE	EDURE:	SOURCE	AND PURITY OF M	ATERIALS:	
Emf measurements on cell [1] were not described in detail. Corrections for liquid junction potentials were not made. Activity corrections were made by the method of incomplete dissociation of $AgNO_3$ and $KIO_3$ solutions.		Nothing s	pecified.			
					· ·	
:			ESTIMATED ERROR:			
			Nothing specified.			
			REFEREN	REFERENCES:		
1			1			

COMPON	ENTS:		ORIGINAL MEASU	REMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Kohlrausch, F.		
(2) Water; H <sub>2</sub> O; [7732-18-5]		Z. Phys. Chem. <u>1908</u> , 64, 129-69.		
VARIABI	JES:		PREPARED BY:	
T/K = 28	2.4, 291.1, 291.5 and	299.8	H. Miyamoto and l	E.M. Woolley
EXPERIM	IENTAL DATA:			
	κ(AgIO <sub>3</sub> )	soly	soly	$\kappa^*(AgIO_3)$
t/⁰C	106S cm <sup>-1</sup>	104mol dm	-3 g dm-3	106S cm <sup>-1</sup>
9.43	8.48	0.971	0.0275	6.86
18.00	11.90	1.36	0.0385	11.90
18 37	12.07	1.38	0.0391	12.17
26.60	16.61	1.90a	0.0539	20.02
were calc probably The effec At 18°C, respective Eqs. [1] a	ulated from the correct the actual measured va- et of temperature on the the molar conductiviti ely, and individual valu- nd [2] were used to ca $\kappa($	ted $\kappa(AgIO_3)$ values (eqs alues subject to correction are electrolytic conductivities es (infinite dilution) of A ues corrected for finite c lculate the solubilities. AgIO_3) = $\kappa(sln) - \kappa(wate)$ lubility = 1000 $\kappa(AgIO_3)$ .	. [1] and [2] below), ns for temperature c ties is given in eq. [3 Ag+ and IO <sub>3</sub> - are 54. oncentrations for eac r) [1] /A [2]	and the κ*(AgIO <sub>3</sub> ) values are hanges in the molar conductivities. ] below. 3 and 33.9 S cm <sup>2</sup> mol <sup>-1</sup> , th temperature are given below.
			JEORMATION	
		COURCE AND DU		
METHOI	)/APPARATUS/PROC	CEDURE:	SOURCE AND PU	RITY OF MATERIALS:
Temperature dependencies were calculated from $\kappa_t = \kappa_{18}[1 + \alpha(t - 18) + \beta(t - 18)^2]$ [3] where $\alpha = 0.0231$ and $\beta = 0.00009$ . The data given in the above table are not fully explained by this equation		$AgIO_3$ was prepared NaIO <sub>3</sub> . The precip dark.	l from solutions of AgNO3 and itate was dried and powdered in the	
The molar conductances corrected for finite concentra- tions are given below ( $\Lambda$ units are S cm <sup>2</sup> mol <sup>-1</sup> ).		ESTIMATED ERR	DR:	
t/0	C A		Nothing specified.	
			DEFEDRICES	
9.	43 87.4		REPERENCES:	
18	.00 87.3			
18	.37 87.3			
26	.60 87.1		]	

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	ORIGINAL MEASUREMENTS: Whitby, G.S.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Z. Anorg. Chem. <u>1910</u> , 67, 62-4 and 107-9.
VARIABLES:	PREPARED BY:
T/K = 293	H. Miyamoto and E.M. Woolley

# EXPERIMENTAL DATA:

The solubility of  $AgIO_3$  in water at 20°C was given as 0.039 g dm<sup>-3</sup>.

From this value, the compilers calculate a solubility of 1.38 x 10<sup>-4</sup> mol dm<sup>-3</sup>.

### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: Saturated solutions were analyzed by diluting a portion to a known volume. To a 50 cm <sup>3</sup> portion of the diluted solution were added several drops of concen- trated NaOH solution, and the resulting solution was placed in a boiling water bath for 2 minutes. 6 drops of 1 mol dm <sup>-3</sup> NaOH solution were added along with a small amount of sucrose, and the mixture heated 20 to 30 seconds, cooled, and the resulting yellowish color intensity measured colorimetrically. The intensity of these solutions were compared to the intensity of standard AgNO <sub>3</sub> solutions treated in an identical manner. The author states that the detection limit for silver is $A = 10^{-5}$ g dm <sup>-3</sup> .	SOURCE AND PURITY OF MATERIALS: Nothing specified.
	ESTIMATED ERROR: Soly: precision ± 5 % (compilers). Temp: nothing specified. REFERENCES:

COMPON	ENTS:		
(1) Silver	iodate;	AgIO <sub>3</sub> ;	[7783-97-3]

(2) Water; H<sub>2</sub>O; [7732-18-5]

Baxter, W.P.

**ORIGINAL MEASUREMENTS:** 

J. Am. Chem. Soc. 1926, 48, 615-21.

VARIABLES:	PREPARED BY:
T/K = 348.15	E.M. Woolley

# EXPERIMENTAL DATA:

	solubility	No. of	deviations f	from the mean	method of
detmn No.	10 <sup>3</sup> mol kg <sup>-1</sup>	expts	max/%	average/%	AgIO <sub>3</sub> prepn
1	0.8415	4	0.17		
2	0.8414	3	0.12		1
3	0.8411	4	0.39		2
4	0.8395	5	0.43		3
5	0.8371	5	0.43		4
6	0.8403	9		0.07	?
7	0.8416	3		0.04	?
8	0.8403	9		0.07	?
9	0.8373	5		0.08	?
10 ·	0.8417	4		0.06	?
11	0.8417	4		0.06	?

Determinations 6 to 11 are specified as referring to "weighed in air." Buoyancy corrections would make the resulting solubilities smaller by less than about 0.1 %. Determinations 1 to 5 are specified as referring to mmol per "1000 g solution," whereas determinations 6 to 11 refer to mmol per "1000 g water." This would make only about 0.024 % difference in the solubilities reported by these two methods. Determinations 10 and 11 appear to refer to the same experiments as do determinations 6 and 8. The average of all values (except 8 and 11) is  $0.839_6 \times 10^{-3} \text{ mol kg}^{-1}$  with a standard deviation of  $0.001_7$ .

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
1.5 g AgIO <sub>3</sub> crystals were rotated with 350 cm <sup>3</sup> water in bottles made of Pyrex tubing and were sealed. The bottles were rotated in a thermostat maintained at 75.00°C for 20 to 100 hours, and equilibrium was approached from both above and below. The bottles were then placed in a rack in the thermostat, the tip of a side tube broken off, and a hole blown in the top neck through which a beated delivery tube was	Initial prepn of AgIO <sub>3</sub> by mixing slns of AgNO <sub>3</sub> and slight excess of warm 0.15 mol dm <sup>-3</sup> KIO <sub>3</sub> . The ppt was washed with cold water, 6-8 liters of hot water, and dried at 110°C for 2 hours. The following correspond to the preparation number given in the above table.		
introduced. The tube contained a wad of asbestos	parts (i.e. they are the same).		
fibers. A sample of 240-300 g of satd sln was removed by using compressed air to force the sln through the delivery tube and the asbestos filter. These aliquots were delivered into weighed glass-stoppered flasks containing 10 cm <sup>3</sup> of dil HCl. After weighing, the	Prepn 3. The initial ppt was dissolved in dil NH <sub>3</sub> solution, pptd with HNO <sub>3</sub> , and washed and dried as above.		
contents of the flask were cooled, 2 g KI added, and the liberated $I_2$ titrated with standardized $Na_2S_2O_3$ .	Prepn 4. These were solid residues from soly determinations using $AgIO_3$ from prepns 1-3. These residues were dissolved in dil $NH_3$ and treated as in 3 above.		
	Ordinary distd water was redistd from $Ag_2SO_4$ sln and then distd once more.		
	ESTIMATED ERROR: Soly: reproducibility within 0.2 %. Temp: precision ± 0.02 K.		

COMPONENTS:	ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Kolthoff, I.M.; Lingane, J.J.		
(2) Water; H <sub>2</sub> O; [7732-18-5]	J. Phys. Chem. <u>1938</u> , 42, 133-40.		
VARIABLES:	PREPARED BY:		
T/K = 298.15	E.M. Woolley		

# EXPERIMENTAL DATA:

initial mass of AgIO <sub>3</sub> grams	numb of expts	average total silver content mmol dm- <sup>3</sup>	average total iodate content mmol dm-3	108K <sub>s0</sub> a mol <sup>2</sup> dm <sup>-6</sup>	calcd soly (K <sub>s0</sub> ) <sup>1/2</sup> mmol dm <sup>-3</sup>
0.05	4	0.1633	0.1839	3.00	0.173
5.0	3	0.1630	0.1910	3.11	0.176
0.05	1p	0.176	0.180	3.17	0.178
0.1	5Ъ	0.1750	0.1796	3.143	0.1773
3.0	Ір	0.176	0.181	3.18	0.179
0.3	3ь	0.1761	0.1780	3.13	0.177¢

aSolublity product  $K_{s0}$  calculated from  $[Ag^+]_{total}[IO_3^-]_{total}$ .

<sup>b</sup>Paraffin-coated bottles used.

cThe authors give an "extrapolated" value of  $1.744 \times 10^{-4} \mod dm^{-3}$  for the solubility at zero ionic strength. The extrapolation was based on this data point and the solubilities in KNO<sub>3</sub> solutions (see the compilation of the AgIO<sub>3</sub>-KNO<sub>3</sub>-H<sub>2</sub>O system by these authors). Based on the extrapolated solubility at zero ionic strength, the authors computed the thermodynamic solubility product K<sub>s0</sub><sup>0</sup> =  $3.04 \times 10^{-8} \mod 2$  dm<sup>-6</sup>.

# AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOUR
AgIO <sub>3</sub> crystals and 200 cm <sup>3</sup> water placed in either plain or paraffin-coated brown glass bottles stoppered with paraffined corks. The bottles were rotated for 3 h in a thermostat at 25°C. Analyses showed that equilibrium was established within one hour. 100 cm <sup>3</sup> samples were withdrawn through a filter pipet with cotton affixed to the tip. The first portion of solution that was withdrawn was discarded, and about 100 cm <sup>3</sup> analyzed for both silver and iodate. Silver was determined by potentiometric titration with 0.001 mol dm <sup>-3</sup> KI solution delivered from a calibrated 10-m1 microburet. Iodate was determined by iodometric titration with freshly prepared and standardized 0.01 mol dm <sup>-3</sup> thiosulfate using a calibrated microburet.	AgIO <sub>3</sub> KIO <sub>3</sub> recrys precip and th It was The A HNO <sub>3</sub> tance

### SOURCE AND PURITY OF MATERIALS:

AgIO<sub>3</sub> prepared by rapid precipitation using dilute  $KIO_3$  (slight excess) and AgNO<sub>3</sub> solutions.  $KIO_3$  was recrystallized three times. AgNO<sub>3</sub> was "pure." The precipitate was aged for 4 days in the mother solution, and then washed twelve times with conductivity water. It was dried in a vacuum oven for 10 hours at 55°C. The AgIO<sub>3</sub> was then recrystallized from 1 mol dm<sup>-3</sup> HNO<sub>3</sub>. Conductivity water had an electrolytic conductance of 1.4 x 10<sup>-6</sup> S cm<sup>-1</sup>.

# ESTIMATED ERROR:

Titrns: precision  $\pm$  0.2 % for Ag and  $\pm$  0.3 % for iodate. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Ricci, J.E.; Amron, I.
(2) Water; H <sub>2</sub> O; [7732-18-5]	J. Am. Chem. Soc. <u>1951</u> , 73, 3613-8.
VARIABLES:	PREPARED BY:
T/K = 298 and 318	H. Miyamoto

	solubility	solubilitya
t/ºC	g dm- <sup>3</sup>	104mol dm-3
25	0.0506	1.79
25	0.0506	1.79
25	0.0512	1.81
25	0.0511	1.81
25	0.0507	1.79
25	0.0509	1.80
average 25	0.0508	1.80
45	0.0995	3.52
45	0.0997	3.53
average 45	0.0996	3.52

<sup>a</sup>Calculated by the compiler.

#### AUXILIARY INFORMATION METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Isothermal method. Excess silver iodate and freshly Commercial AgIO<sub>3</sub> was purified by recrystallization or boiled, distilled water were placed in Pyrex bottles and by washing with warm dilute nitric acid and water. rotated in a large constant temperature water bath. At The product was dried at 100°C. The purity of the 25°C the bottles were rotated for 7 days and 5 months, solid was determined by both iodometric titration and at 45°C, the bottles were rotated for 2 days. After (99.9-100.0 %) and by gravimetric silver determination allowing the solid to settle, the saturated solutions were (99.6 %). sampled with calibrated delivery pipets fitted with filter paper tips. Solutions analyzed for iodate with sodium thiosulfate. **ESTIMATED ERROR:** Soly: precision $\pm$ 0.8 % deviation from the mean. Temp: precision probably $\pm$ 0.05 K (compiler).

**REFERENCES:** 

182 Silver	Silver Iodate		
COMPONENTS: (1) Silver iodate; AgIO <sub>5</sub> ; [7783-97-3]	ORIGINAL MEASUREMENTS: Shchigol, M.B.		
(2) Potassium iodate; KIO <sub>8</sub> ; [7758-05-6]	Zh. Obshch. Khim. <u>1952</u> , 22, 721-30: J. Gen. Chem. USSR (Engl. Transl.) <u>1952</u> , 22, 787-94.		
(3) Water; H <sub>2</sub> O; [7732-18-5]			
VARIABLES:	PREPARED BY:		
Room temperature: T/K ~ 293 to ~ 295	E.M. Woolley and H. Miyamoto		
EXPERIMENTAL DATA:			
KIO3 concn mol dm-3	AgIO <sub>3</sub> solubility mol dm <sup>-3</sup>		
0.005	6.0 x 10 <sup>-5</sup>		
0.025	5.0 x 10-4		
AUXILIARY IN	FORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Precipitated $AgIO_3$ placed in 100 cm <sup>3</sup> flasks to which were added 25 cm <sup>3</sup> water and KIO <sub>3</sub> . The volume was adjusted to 100 cm <sup>3</sup> by additions of water. The solutions were agitated for 24 hours, filtered, and the iodate content of the filtrate determined iodometrically. Only the mean value of three determinations was given. Presumably the solubility was determined as the difference between the measured total iodate concen- tration and the initial KIO <sub>3</sub> concentration.	Nothing specified.		
	ESTIMATED ERROR:		
	Nothing specified.		
	REFERENCES:		

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]		ORIGINAL MI	ORIGINAL MEASUREMENTS: Kolthoff, I.M.; Lingane, J.J. J. Phys. Chem. <u>1938</u> , 42, 133-40.		
		Kolthoff, I.M.			
		J. Phys. Chen			
(3) Wat	er; H <sub>2</sub> O; [7732-18-5]	I			
VARIA Concen T/K =	BLES: tration of potassium 298.15	nitrate	PREPARED B' H. Miyamoto	Y:	
EXPER	IMENTAL DATA:				
		total	total	average	
	KNO3 concn mol dm <sup>-3</sup>	silver content mmol dm <sup>-3</sup>	iodate content mmol dm <sup>-3</sup>	solubility mmol dm <sup>-3</sup>	
	0	0.1761=	0.1780ª	0.1771	
	0.001301	0.1813	0.1832	0.1823	
	0.003252	0.1863	0.1877	0.1870	
	0.006503	0.1908	0.1919	0.1914	
	0.01410	0.1991	0.1996	0.1994	
	0.07050	0.2302	0.2300	0.2301	
	0.1995	0.2668	0.2663	0.2665	

<sup>a</sup>Average of 3 experiments (see the compilation on the AgIO<sub>3</sub>-H<sub>2</sub>O system by these authors).

0.3345

0.4087

The authors give an "extrapolated" value of 1.744 x 10<sup>-4</sup> mol dm<sup>-3</sup> for the solubility at zero ionic strength. Based on this extrapolated solubility, the authors computed the thermodynamic solubility product  $K_{s0}^0 = 3.04 \text{ x}$  10<sup>-8</sup> mol<sup>2</sup> dm<sup>-6</sup>.

0.3284

0.4086

### AUXILIARY INFORMATION

### METHOD/APPARATUS/PROCEDURE:

0.4995

0.9989

AgIO<sub>3</sub> crystals and 200 cm<sup>3</sup> KNO<sub>3</sub> solution placed in paraffin-coated brown glass bottles stoppered with paraffined corks. The bottles were rotated for 3 h in a thermostat at 25°C. Analyses showed that equilibrium was established within one hour. 100 cm<sup>3</sup> samples were withdrawn through a filter pipet with cotton affixed to the tip. The first portion of solution that was withdrawn was discarded, and about 100 cm<sup>3</sup> analyzed for both silver and iodate. Silver was determined by potentiometric titration with 0.001 mol dm<sup>-3</sup> KI solution delivered from a calibrated 10-ml microburet. Iodate was determined by iodometric titration with freshly prepared and standardized 0.01 mol dm<sup>-3</sup> thiosulfate using a calibrated microburet.

# SOURCE AND PURITY OF MATERIALS:

0.3314

0.4086

AgIO<sub>3</sub> prepared by rapid precipitation using dilute KIO<sub>3</sub> (slight excess) and AgNO<sub>3</sub> solutions. KIO<sub>3</sub> was recrystallized three times. AgNO<sub>3</sub> was "pure." The precipitate was aged for 4 days in the mother solution, and then washed twelve times with conductivity water. It was dried in a vacuum oven for 10 hours at 55°C. The AgIO<sub>3</sub> was then recrystallized from 1 mol dm<sup>-3</sup> HNO<sub>3</sub>. KNO<sub>3</sub> was recrystallized several times and shown to be free from chloride. Conductivity water had an electrolytic conductance of 1.4 x 10<sup>-6</sup> S cm<sup>-1</sup>.

## ESTIMATED ERROR:

Titrns: precision  $\pm$  0.2 % for Ag and  $\pm$  0.3 % for iodate. Temp: precision  $\pm$  0.02 K.

**REFERENCES:** 

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C.
(3) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1]	J. Am. Chem. Soc. <u>1941</u> , 63, 2670-4.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
$\frac{Concentration of KNO_3}{T/K} = 298$	E.M. Woolley

### EXPERIMENTAL DATA:

The solubility of silver iodate in aqueous potassium nitrate solutions was determined by iodometric titration, and all results were presented graphically. The authors found the solubility to follow the equations given below where S is the solubility in mol dm<sup>-3</sup> units ( $S_c$ ) or mol kg<sup>-1</sup> units ( $S_m$ ).

Based on mol dm-3 units.

 $-\log S_{c} = -\log S_{c}^{0} - (0.5056 I_{c}^{1/2}/(1 + I_{c}^{1/2}) + 0.150 I_{c})$ [1]

where

 $I_c = [KNO_3] + S_c \text{ and } S_c^0 = 1.746 \text{ x } 10^{-4} \text{ mol } dm^{-3}$  [2]

Based on the results of eq. [2], the compiler calculates  $K_{s0} = (S_c^0)^2 = 3.049 \times 10^{-8} \text{ mol}^2 \text{ dm}^{-6}$ .

Based on mol kg-1 units.

$$-\log S^{m} = -\log S_{m}^{0} - \{0.5056 I_{m}^{1/2}/(1 + I_{m}^{1/2}) + 0.160 I_{m}\}$$
[3]

where

 $I_m = \{KNO_3\} + S_m \text{ and } S_m^0 = 1.754 \text{ x } 10^{-4} \text{ mol kg}^{-1}$  [4]

The authors gave  $K_{s0} = (S_m^0)^2 = 3.076 \times 10^{-8} \text{ mol}^2 \text{ kg}^{-1}$ .

The measured solubilities were stated to fit eqs. [1]-[4] within 0.4 % maximum deviation, and within 0.17 % average deviation.

### AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Silver iodate crystals and aqueous $KNO_3$ were stirred in Pyrex flasks immersed in a water bat at 25°C for two or more hours. Saturation was verified by subsequent analysis. 200 cm <sup>3</sup> samples of the saturated solutions were removed by forcing the solution through a filter and into a pipet by air pressure. The iodate content of weighed samples was determined iodometrically with standardized 0.01 mol dm <sup>-3</sup> thiosulfate solution.	AgIO <sub>3</sub> prepared by slowly adding solutions of AgNO <sub>3</sub> and KIO <sub>3</sub> to a large volume of water in the dark with continuous stirring. The precipitate was washed and dried in air. Analysis was consistent with the stoi- chiometry. KNO <sub>3</sub> of reagent grade was recrystallized and dried at $110^{\circ}$ C.
	ESTIMATED ERROR: Soly: nothing specified, but the precision in the fit to eqs. [1]-[4] is given above. Temp: nothing specified.
	REFERENCES:

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		Onver	104410			
COMPONENTS:			ORIGINAL MEA	SUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [	7783-97-3]		Li, N.C.C.; Lo,	YT.		
(2) Potassium nitrate; KN	O <sub>3</sub> ; [7757-79-1	3	J. Am. Chem. S	oc. <u>1941,</u> 63, 394	<b>!-</b> 7.	
(2) Water; H <sub>2</sub> O; [7732-18-	-5]					
VARIABLES:			PREPARED BY:			
Concentration of potassiun $T/K = 283, 293, 298, 3$	m nitrate 103 and 308		H. Miyamoto an	d E.M. Woolley		
EXPERIMENTAL DATA:						
KNO- conce/mol dm-3	solubility	/ of ΔσΙΟ <sub>2</sub> (10	4mol dm-3a) as a fu	inction of temper	ature	
KINO3 concil/mor din v	10ºC	20°C	25ºC	30°C	35ºC	
ОЪ	0.06055	1 442b	1 748b	2 11Qb	2 541b	
	0.9003-	1,442~	1.748-	2.119~	2.541~	
0.0	0.97	1.405	1.785	2,152	2.367	
0.001301	1.0016	1.500	1.027	2 2 1 2	2.662	
0.001320	1.0010	1.508	1 060	2.212	2.003	
0.003252	1.022	1 5 4 2	1.808		2.714	
0.003263	1.023	1.543		2.203	2.714	
0.006464	1.054	1.582		2.324	2.780	
0.006503			1.913			
0.01404	1.104	1.656		2.419	2.920	
0.01410			2.002			
0.07032	1.279	1.943		2.844	3.381	
0.07050			2.304			
0.1213			2.454	3.041		
0.2003					3.908	
0.2528			2.793	3.428		
0.4987					4.803	
0.5050			3.330	4.035		
0.8378			3.904			
<sup>a</sup> It is not entirely clear w differences would be sma	hether these va ill, the authors	lues are expres	essed as mol dm- <sup>3</sup> or ve (incorrectly?) cor	• mol kg-1, and a mpared and comb	lthough the bined their	
	continued					
		AUXILIARY	INFORMATION			
METHOD/APPARATUS/	PROCEDURE	:	SOURCE AND	PURITY OF MA	TERIALS:	
AgIO, anystals and KNO	- colutions war	e placed in	AgIOs prend by	mixing dil colut	ions of a p grad	

AgIO<sub>3</sub> crystals and KNO<sub>3</sub> solutions were placed in brown glass bottles coated inside with paraffin and closed with paraffined corks. The bottles were rotated in a thermostat at specified temperatures, and three solubility determinations were made for each KNO<sub>3</sub> solution at each temperature. The solubility of AgIO<sub>3</sub> was determined iodometrically by titration of 100 cm<sup>3</sup> aliquots of filtered saturated solution with 0.01 mol dm<sup>-3</sup> Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solutions which were frequently standardized by titration into potassium dichromate according to (1).

AgIO<sub>3</sub> prepd by mixing dil solutions of c.p. grade AgNO<sub>3</sub> and twice recrystallized KIO<sub>3</sub>. The ppt was aged for several days, washed repeatedly with conductivity water, and dried under vacuum at  $60^{\circ}$ C. KNO<sub>3</sub> was recrystallized three times.

### **ESTIMATED ERROR:**

Titrations accurate to  $\pm$  0.3 %. Soly: reproducibility not specified. Temp: precision  $\pm$  0.05 K.

### **REFERENCES:**

 Kolthoff, I.M.; Lingane, J.J. J. Phys. Chem. <u>1938</u>, 42, 133.

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**ORIGINAL MEASUREMENTS: COMPONENTS:** (1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3] Li, N.C.C.; Lo, Y.-T. J. Am. Chem. Soc. 1941, 63, 394-7. (2) Potassium nitrate; KNO3; [7757-79-1] (2) Water; H<sub>2</sub>O; [7732-18-5] EXPERIMENTAL DATA: (continued.....) results directly with other work based on mol kg-1 concentration units. <sup>b</sup>These are "extrapolated" thermodynamic values, based on an extended Debye-Hückel formula. The extrapolated solubilities are designated as S<sup>0</sup>. Based on the extrapolated "thermodynamic solubilities," the solubility products at various temperatures were computed from  $K_{s0} = (S^0)^2$ , and the results are given below. t/ºC 10 20 25 30 35 10<sup>8</sup>K<sub>s0</sub>c,d 0.923 2.078 3.055 4.490 6.456 108K<sub>80</sub>c,e 0.923 2.079 3.056 4.490 6.457 Based on mol dm-3 units. dAuthors' calculations. Compilers' calculations. Using the above compilers' values, the compilers fitted the K to values to eq. [1] by the method of least squares, and the results were used to compute the thermodynamic parameters given below.  $ln K_{s0} = a + b/(T/K)$ [1] a = 5.4878 $b = -6.79344 \times 10^3 K$  $\Delta H = -Rb + RT^2(dln \rho^0/dT) = 14418$  cal mol<sup>-1</sup>.  $\Delta S(298.15 \text{ K}) = 10.87 \text{ cal mol}^{-1} \text{ K}^{-1}$ . In the relation for  $\Delta H$ ,  $\rho^0$  is the density of pure water. The standard deviation for the fit to eq. [1] is 0.0048 which corresponds to about 0.5 % error in  $K_{s0}$ , or about 0.3 % error in the measured solubilities.

Silv	er lodate	187	
OMPONENTS: Silven indeter Actor (7782-07-2) Dester W P		MEASUREMENTS:	
(1) Silver iouale, $Agio_3$ , [7785-57-5] (2) Potassium nitrate: $KNO_{0}$ : [7757-79-1]	Baxter, w.r.		
(2) Yotassian milita, $[1733, [1737, 15-1]]$ (3) Water; $H_2O$ ; $[7732-18-5]$	J. Am. Cher	n. Soc. <u>1926,</u> 48, 615-21.	
VARIABLES:	PREPARED	BY:	
T/K = 348.15	E.M. Woolle	E.M. Woolley and H. Miyamoto	
EXPERIMENTAL DATA:	l	·····	
KNO. concas solubilitya	No. of	average deviation	
mol kg-1 $10^3$ mol kg-1	expts	from the mean (%)	
0.0 0.8416	3	0.04	
0.001 0.8547	2	0.16	
0.002 0.8660	2	0.10	
0.005 0.8875	2	0.02	
0.010 0.9158	2	0.04	
0.020 0.9570	1		
0.050 1.0365	2	0.07	
0.100 1.1258	2	0.11	
AUXILIARY	 INFORMATIO	۰	
METHOD/APPARATUS/PROCEDURE:	SOURCE AN	ND PURITY OF MATERIALS:	
1.5 g AgIO <sub>3</sub> crystals were rotated with 350 cm <sup>3</sup> KNC solution in bottles made of Pyrex tubing and were sealed. The bottles were rotated in a thermostat maintained at 75.00°C for 20 to 100 hours, and equilibrium was approached from both above and below. The bottles were then placed in a rack in the thermostat, the tip of a side tube broken off, and a hole blown in the top neck through which a heated delivery tube was introduced. The tube contained a wad of asbestos fibers. A sample of 240-300 g of sa sln was removed by using compressed air to force th sln through the delivery tube and the asbestos filter. These aliquots were delivered into weighed glass-stop pered flasks containing 10 cm <sup>3</sup> of dil HCl. After weighing, the contents of the flask were cooled, 2 g	<ul> <li>P3 Initial prepn slight excess was washed and dried at the four prep prepn was us</li> <li>Prepn 1 and parts (i.e. the solution, ppt above.</li> <li>KI Prepn 4. Th</li> </ul>	of AgIO <sub>3</sub> by mixing sins of AgNO <sub>3</sub> and of warm 0.15 mol dm <sup>-3</sup> KIO <sub>3</sub> . The ppt with cold water, 6-8 liters of hot water, 110°C for 2 hours. The following defines ons, but the author does not specify which sed in the present study. 2: the initial AgIO <sub>3</sub> was divided into 2 ey are the same). the initial ppt was dissolved in dil NH <sub>3</sub> d with HNO <sub>3</sub> , and washed and dried as	
added, and the liberated $I_2$ titrated with standardized $Na_2S_2O_3$ .	ordinary dis	$g AgIO_3$ from prepns 1-3. These residues ed in dil NH <sub>3</sub> and treated as in 3 above. tilled water was redistilled from a Ag <sub>2</sub> SO <sub>4</sub> then redistilled	

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C.p. grade  $KNO_3$  was recrystallized 1 to 3 times, washed free of chloride and dried at 120°C for five or more hours.

# ESTIMATED ERROR:

Soly: reproducibility within 0.2 %. Temp: precision  $\pm$  0.02 K.

# Silver Iodate

COMPONENTS:		ORIGINAL N	ORIGINAL MEASUREMENTS:			
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97	-3]	Baxter, W.P.				
(2) Potassium perchlorate; KClO4;	[7778-74-7]	1				
(3) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Cher	n. Soc. <u>1926,</u> 48, 615-21.			
VARIABLES:		PREPARED	BY:			
Concentration of potassium perch $T/K = 348.15$	lorate	E.M. Woolle	y and H. Miyamoto			
EXPERIMENTAL DATA:						
KClO <sub>4</sub> concn <sup>a</sup>	solubilitya	No. of	average deviation			
mol kg-1	10 <sup>3</sup> mol kg <sup>-1</sup>	expts	from the mean (%)			
0.0	0.8403	9	0.07			
0.002	0.8661	3	0.09			
0.005	0.005 0.8900		0.03			
0.010	0.9143	2	0.06			
0.020	0.9503	2	0.08			
0.050	1.0183	2	0.04			
0.100 1.0882		2	0.04			
*These are specified as referring concentrations smaller by less that	to masses "weighed i in about 0.1 %.	n air." Buoyanc	y corections would make the resulting			
	AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCE	DURE:	SOURCE AN	ND PURITY OF MATERIALS:			

METHOD/APPARATUS/PROCEDURE: See the $AgIO_3$ - $KNO_3$ - $H_2O$ compilation by this author for complete experimental details and estimated errors.	SOURCE AND PURITY OF MATERIALS: See previous compilations of this author's publication for details on prepn of AgIO <sub>3</sub> . C.p. grade KClO <sub>4</sub> was recrystallized, washed and dried at 120°C for five or more hours.

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-	-3]	Baxter, W.P.		
(2) Potassium sulfate; K <sub>2</sub> SO <sub>4</sub> ; [777	8-80-5]			
(3) Water; H <sub>2</sub> O; [7732-18-5]		J. Am. Cher	m. Soc. <u>1926</u> , 48, 615-21.	
VARIABLES:		PREPARED	BY:	
Concentration of potassium sulfate	•			
1/K = 348.15		E.M. Woolle	y and H. Miyamoto	
EXPERIMENTAL DATA:				
K₂SO₄ concn <sup>в</sup>	solubilitya	No. of	average deviation	
mol kg-1	10 <sup>3</sup> mol kg <sup>-1</sup>	expts	from the mean (%)	
0.0	0.8403	9	0.07	
0.0	0.8373	5	0.08	
0.0005	0.8555	2	0.08	
0.001	0.8760	2	0.04	
0.002	0.9024	2	0.12	
0.005	0.9603	2	0.07	
0.010	1.0241	2	0.04	
0.020	1.1110	2	0.06	
0.050	1.2932	2	0.26	
*These are specified as referring t	to masses "weighed in	air." Buoyanc	y corections would make the resulting	
concentrations smaller by less than	n about 0.1 %.	_		
	AUXILIARY II	NFORMATION	۷	
METHOD/APPARATUS/PROCE	DURE:	SOURCE AN	ND PURITY OF MATERIALS:	
See the $AgIO_3$ -KNO <sub>8</sub> -H <sub>2</sub> O compilation by this author		See previous compilations of this author's publication		
for complete experimental details and estimated errors.		for details on prepn of AgIO <sub>3</sub> . C.p. grade K <sub>2</sub> SO <sub>4</sub> was		
1		recrystallized, washed and dried at 120°C for five or		
		more hours.		

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COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		ORIGINAL M	ORIGINAL MEASUREMENTS:		
		Baxter, W.P.			
(2) Magnesium sulfate; MgSO <sub>4</sub> ; [7	487-88-9]				
(3) Water; $H_2O$ ; [7732-18-5]		J. Am. Chen	n. Soc. <u>1926</u> , 48, 615-21.		
VARIABLES:		PREPARED	BY:		
Concentration of magnesium sulf T/K = 348.15	ate	E.M. Woolle	y and H. Miyamoto		
EXPERIMENTAL DATA:					
MgSO <sub>4</sub> concn <sup>a</sup>	solubilitya	No. of	average deviation		
mol kg-1	10 <sup>3</sup> mol kg <sup>-1</sup>	expts	from the mean (%)		
0.0	0.8417	4	0.06		
0.0002	0.8522	2	0.00		
0.0005	0.8698	1	,		
0.001	0.8855	2	0.04		
0.002	0.9111	2	0.03		
0.005	0.9629	1			
0.010	1.0201	2	0.01		
0.020	1.0928	2	0.35		
<sup>a</sup> These are specified as referring	to masses "weighed i	in air." Buoyanc	y corections would make the resulting		
concentrations smaller by less that	n about 0.1 %.				
	AUVITADV	INFORMATION	J		

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
See the AgIO <sub>3</sub> -KNO <sub>3</sub> -H <sub>2</sub> O compilation by this author	See previous compilations of this author's publication			
for complete experimental details and estimated errors.	for details on prepn of AgIO <sub>3</sub> . "Very pure" MgSO <sub>4</sub> was			
	recrystallized, and the Mg content detd gravimetrically			
	as $Mg_2P_2 O_7$ .			

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver iodate: AgIO <sub>3</sub> : [7783-97-3	1	Baxter, W.P.		
(2) Barium nitrate; Ba(NO <sub>3</sub> ) <sub>2</sub> ; [1002]	2-31-8]			
(3) Water; H <sub>2</sub> O; [7732-18-5]	•	J. Am. Cher	m. Soc. <u>1926,</u> 48, 615-21.	
VARIABLES:	······································	PREPARED	BY:	
Concentration of barium nitrate $T/K = 348.15$		E.M. Woolle	ey and H. Miyamoto	
EXPERIMENTAL DATA:				
Ba(NO <sub>3</sub> ) <sub>2</sub> concn <sup>a</sup>	solubility <sup>a</sup>	No. of	average deviation	
mol kg-1	10 <sup>3</sup> mol kg <sup>-1</sup>	expts	from the mean (%)	
0.0	0.8417	4	0.06	
0.0005	0.8646	2	0.02	
0.001	0.8717	2	0.05	
0.002	0.8973	-		
0.005	0.9322	1		
0.010 0.9664		2	0.15	
These are specified as referring to	masses "weighed in	air." Buovanc	v corections would make the resulting	
concentrations smaller by less than	about 0.1 %.		· · · · · · · · · · · · · · · · · · ·	
	AUXILIARY IN	NFORMATION	N	
METHOD/APPARATUS/PROCED	URE:	SOURCE AND PURITY OF MATERIALS:		
See the AgIO <sub>3</sub> -KNO <sub>3</sub> -H <sub>2</sub> O compila	tion by this author	See previous compilations of this author's publication		
for complete experimental details an	nd estimated errors.	for details on prepn of AgIO <sub>3</sub> . C.p. grade Ba(NO <sub>3</sub> ) <sub>2</sub>		
		recrystallized 1-3 times, washed and dried at 120°C for		
		five or more	hours.	

	Si	il	v	e	r	۱	o	d	а	t	e
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COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]			Kolthoff, I.M.; Lingane, J.J.		
[10022-31-8]					
		J. Am. Chei	n. Soc. <u>1938</u> , 42, 133-40.		
	I	PREPARED	BY:		
at 0.01 mol dm <sup>-3</sup> .		H. Miyamot	0		
EXPERIMENTAL DATA: Note that the concentration of barium nitrate is fixed at			3.		
initial mass total Ag tot		tal IO <sub>3</sub> -			
content	con	tent	10 <sup>8</sup> K <sub>s0</sub> <sup>a</sup>		
mmol dm-3	mm	iol dm-3	mol <sup>2</sup> dm <sup>-6</sup>		
0.211	0.2	214	4.52		
3.0 0.220 0.		208	4.58		
I from $K_{s0} = [Ag^+]_{tot}$	al[IO3-]t	otal			
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
AgIO <sub>3</sub> crystals added to 0.01 mol dm <sup>-3</sup> Ba(NO <sub>3</sub> ) <sub>2</sub> solutions, and remaining details identical to those in the compilation on the AgIO <sub>3</sub> -KNO <sub>3</sub> -H <sub>2</sub> O system by these			crystallized several times and shown loride. Remaining details in compile left.	to be ation	
	3-97-3] [10022-31-8] at 0.01 mol dm-3. of barium nitrate is fi total Ag content mmol dm-3 0.211 0.220 d from $K_{s0} = [Ag+]_{tot}$ AUXILIA OCEDURE: mol dm-3 Ba(NO_3)2 ails identical to those NO_3-H_2O system by	3-97-3] [10022-31-8] at 0.01 mol dm-3. of barium nitrate is fixed at 0 total Ag tota content con mmol dm-3 mr 0.211 0.2 0.220 0.2 d from $K_{s0} = [Ag+]_{total}[IO_3-]_{total}[$	3-97-3] [10022-31-8]ORIGINAL M Kolthoff, I.I J. Am. Cherat 0.01 mol dm-3.J. Am. Cherat 0.01 mol dm-3.PREPARED- H. Miyamotof barium nitrate is fixed at 0.01 mol dm-3H. Miyamotof barium nitrate is fixed at 0.01 mol dm-30.01 mol dm-3total Ag content mmol dm-3total IO <sub>3</sub> - content content mmol dm-30.211 0.2200.214 0.2081 from K_{s0} = [Ag+]total[IO <sub>3</sub> -]total.AUXILIARY INFORMATION OCEDURE: mol dm-3 Ba(NO <sub>3</sub> )2 hils identical to those in the NO <sub>3</sub> -H <sub>2</sub> O system by these	3-97-3] [10022-31-8]ORIGINAL MEASUREMENTS: Kolthoff, I.M.; Lingane, J.J. J. Am. Chem. Soc. <u>1938</u> , 42, 133-40.at 0.01 mol dm-3.PREPARED BY: H. Miyamotoat 0.01 mol dm-3.PREPARED BY: H. Miyamotoof barium nitrate is fixed at 0.01 mol dm-3. total Ag content mmol dm-3total IO3- mmol dm-3total Ag mmol dm-3total IO3- mmol dm-30.211 0.211 0.2200.214 0.2084.58I from K_{s0} = [Ag+]total[IO3-]total.AUXILIARY INFORMATIONOCEDURE: mol dm-3SOURCE AND PURITY OF MATERIALS: Ba(NO3)2 recrystallized several times and shown free from chloride. Remaining details in compil cited on the left.	

COMPONENTS:		ORIGINAL	ORIGINAL MEASUREMENTS:			
(1) Silver iodate; AgIO <sub>3</sub>	; [7783-97-3]	Kolthoff, I.	Kolthoff, I.M.; Lingane, J.J.			
(2) Thallium nitrate; Tll	NO <sub>3</sub> ; [10102-45-1]					
(3) Water; H <sub>2</sub> O; [7732-1	8-5]	J. Am. Che	em. Soc. <u>1938</u> , <b>42</b> , 133-40.			
VARIABLES:		PREPARED	BY:			
$TINO_3$ concentration fix T/K = 298.15	ed at 0.01 mol dm <sup>-3</sup> .	H. Miyamo	to			
EXPERIMENTAL DAT. Note that the concentra	A: tion of thallium nitrate is	s fixed at 0.01 mol dr	m-3.			
initial mass	total Ag	total IO3-				
of AgIO <sub>3</sub>	content	content	10 <sup>8</sup> K <sub>s0</sub> <sup>a</sup>			
grams	mmol dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>			
0.05	0.200	0.198	3.96			
3.0	3.0 0.205 0.		3.92			
Solubility product calculated from $K_{s0} = [Ag^+]_{total}[IO_3^-]_{total}$ .						
	AUXIL	IARY INFORMATIO	N			
METHOD/APPARATU	S/PROCEDURE:	SOURCE A	SOURCE AND PURITY OF MATERIALS:			
AgIO <sub>3</sub> crystals added to solutions, and remaining compilation on the Agi authors.	0.01 mol dm <sup>-3</sup> TlNO <sub>3</sub> g details identical to thos IO <sub>3</sub> -KNO <sub>3</sub> -H <sub>2</sub> O system l	e in the lation cited by these	recrystallized. Remaining details in compi- on the left.			

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	ORIGINAL MEASUREMENTS: Ricci, J.E.; Amron, I.
(2) Silver nitrate; AgNO <sub>3</sub> ; [7761-88-8]	J. Am. Chem. Soc. <u>1951</u> , 73, 3613-8.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES: Silver nitrate concentration T/K = 298	PREPARED BY: H. Miyamoto and M. Salomon

#### EXPERIMENTAL DATA:

silver nitrate concentration<sup>a</sup>

silver iodate solubility<sup>a</sup>

mass %	mol kg <sup>-1</sup>	mass %	mol kg <sup>-1</sup>
22.65	1.72	0.009	0.41
48.47	5.54	0.006	0.41
70.43	14.02	0.035	4.2
71.84	15.04	0.040 to 0.043	5.0 to 5.4

<sup>a</sup>Molalities calculated by the compilers.

#### AUXILIARY INFORMATION

#### METHOD/APPARATUS/PROCEDURE: SOURCE AND PURITY OF MATERIALS: Isothermal method. Excess silver iodate and AgNO<sub>3</sub> Commercial AgIO<sub>3</sub> was purified by recrystallization or by washing with warm dilute nitric acid and water. solution prepared with freshly boiled distilled water were placed in Pyrex bottles and rotated in a large The product was dried at 100°C. The purity of the solid was determined by both iodometric titration constant temperature water bath. The total solid was determined by evaporation to dryness after addition of (99.9-100.0 %) and by gravimetric silver determination (99.6 %). a drop of concd HNO<sub>3</sub>, which apparently by preventing reduction of silver, always gave pure white residues. The final weighed residue was taken up in water C.p. grade AgNO<sub>3</sub> was dried and not treated any for determination of AgIO<sub>3</sub>, whereupon AgNO<sub>3</sub> was further. calculated by difference. For iodate determination, the solution of the residue **ESTIMATED ERROR:** was treated with HCl to precipitate AgCl and the Soly: precision ± 0.003 mass %. filtrate was titrated with 0.01 N sodium thiosulfate. Temp: precision probably ± 0.05 K (compiler). The isotherm was of the simplest type: i.e. neither **REFERENCES:** hydrates nor double salts were formed.

Silver Iodate

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COMPONENTS:	ORIGINAL MEASUREMENTS:			
<ol> <li>(1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3]</li> <li>(2) Nitric acid; HNO<sub>3</sub>; [7697-37-2]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> </ol>	Longi, A. Gazz. Chim. Ital. <u>1883</u> , 13, 87-9.			
VARIABLES: Concentration of nitric acid T/K = 298	PREPARED BY: B. Scrosati			
EXPERIMENTAL DATA:				
In pure water, the solubility of AgIO <sub>3</sub> was given as: 1 g in 27728.94 g H <sub>2</sub> O (1.28 x 10 <sup>-4</sup> mol kg <sup>-1</sup> , compiler) and 1 g in 27821.88 cm <sup>3</sup> sln (1.27 x 10 <sup>-4</sup> mol dm <sup>-3</sup> , compiler). In an aqueous solution of 35 mass % HNO <sub>3</sub> (specific gravity = 1.21), the solubility is 1 g in 859.81 cm <sup>3</sup> sln (4.11 x 10 <sup>-3</sup> mol dm <sup>-3</sup> , compiler).				
AUXILIARY IN	FORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Nothing specified. Solubility probably determined by evaporation and weighing.	Nothing specifed.			

COMPONENTS:			ORIGINAL MEASUREMENTS:				
<ol> <li>(1) Silver iodate; AgIO<sub>3</sub>; [7783-97-3]</li> <li>(2) Ammonia; NH<sub>3</sub>; [7664-41-7]</li> <li>(3) Water; H<sub>2</sub>O; [7732-18-5]</li> </ol>			Longi, A. Gazz. Chim. Ital. <u>1883,</u> 13, 87-9.				
VARIABLE	S:		PREPARED BY:	PREPARED BY:			
Concentratio T/K = 298	on of ammonia		B. Scrosati				
EXPERIME	NTAL DATA:	<u> </u>					
aq ammor	nia sin composition		AgIO <sub>3</sub> solub	ility at 25°C			
mass %	specific gravity	cm <sup>3</sup> sin/g	mol dm <sup>-3a</sup>	g sin/g	mol kg <sup>-1a</sup>		
0.5	0.998	42.73	0.0828	42.39	0.0834		
10	0.96	2.383	1.48	2.202	1.61		
<sup>a</sup> Calculat	ed by the compiler.						
		AUXILIARY I	NFORMATION				
METHOD/A	APPARATUS/PROCED	URE:	SOURCE AND P	URITY OF MAT	'ERIALS:		
Nothing specified. Solubility probably determined by evaporation and weighing.			Nothing specifed.				

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]			Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C.		
(2) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7]			J. Am. Chem. Soc. <u>1941</u> , 63, 2670-4.		
(3) Water; H <sub>2</sub> O; [7732-18-5]	I				
VARIABLES:	**	PREPA	RED BY:		
Concentration of ammonia					
T/K = 298		H. Mi	yamoto		
EXPERIMENTAL DATA:				www.ee	
total NH <sub>3</sub> concn	solubilitya	density	ionic strength	108KIP	
mol kg <sup>-1</sup>	mmol kg <sup>-1</sup>	kg dm-3	mmol dm-3	mol <sup>2</sup> dm <sup>-6</sup>	
0.01241	3 665	0.007	3.08	6.07	
0.01241	3.005	0.997	3.96	5.00	
0.01207	5.732	0.997	4.00	5.99	
0.01843	J.488	0.331	3.87	0.13	
0.02481	7.430	0.998	7.88	6.13	
0.03085	9.358	0.997	9.86	5.92	
0.06180	19.01	1.003	19.74	6.11	
0.1028	32.23	1.003	33.2	6.04	
0.1249	39.32	1.005	40.4	6.18	
0.1847	59.37	1.009	60.7	6.05	
0.2487	81.25	1.014	82.8	5.97	
where $K_I$ was calculated from a vaccoefficients, $NH_3$ ionization	$K_I = [Ag+][NH_3]$ alue of the thermodynan a, and material balance e	<sup>2</sup> /[Ag(NH <sub>3</sub> ) <sub>2</sub> ; nic solubility quations.	•] product of K <sub>*0</sub> = 3.0	76 x 10 <sup>-8</sup> , activity	
	AUXILIAR	Y INFORM	TION		
METHOD/APPARATUS/P	ROCEDURE:	SOUR	CE AND PURITY OF	MATERIALS:	
Ammonia solutions were stirred in Pyrex flasks immersed in a water bath at 25°C for two or more hours. Saturation was verified by subsequent analyses. 200 cm <sup>3</sup> aliquots of equilibrated solutions removed by forcing the solution through a filter and into a pipet by air pressure to avoid loss of NH <sub>3</sub> . The weighed solutions were delivered into excess standardized 0.1 mol dm <sup>-3</sup> HCl, and the excess acid titrated with standardized 0.1 mol dm <sup>-3</sup> NaOH with methyl red indicator.			prepared by slowly as $O_3$ to a large volume lous stirring. The pre- n air. Analysis was c try. A stock solution tion of a concentrated sysis to contain a negl	dding solutions of AgNO <sub>3</sub> of water in the dark with ecipitate was washed and onsistant with the stoi- of ammonia was prepared d solution that was shown igible amount of carbonate.	
The solubility was determin	ned by analysis of the io	date ESTIM	ATED ERROR:		
concentration by iodometric 0.01 mol dm <sup>-3</sup> thiosulfate so	c titration with standardi olution.	zed Nothin	Nothing specifed.		
			REFERENCES:		

Silver lodate

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	Silve	r lodate	
COMPONENTS:		ORIGINAL MEASU	REMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [77	83-97-3]	Hill, A.E.; Simmons	, J.P.
(2) Nitric acid; HNO <sub>3</sub> ; [7697	7-37-2]	J. Am. Chem. Soc.	<u>1909</u> , <b>31</b> , 821-39.
(3) Water; H <sub>2</sub> O; [7732-18-5]			
VARIABLES: Concentration of nitric acid		PREPARED BY:	
T/K = 298		H. Miyamoto	
EXPERIMENTAL DATA:			
	Ag(IO <sub>3</sub> ) solu	ibility	
HNO <sub>3</sub> concn	from supersatn	from undersatn	averages <sup>a</sup>
mol dm-3	g dm-3	g dm-3	10 <sup>3</sup> mol dm <sup>-3</sup>
0.000	0.0506	0.0500	0.178
0.125	0.0876	0.0852	0.304
0.250	0.1065	0.1084	0.379
0.500	0.1433	0.1394	0.499
1.00	0.2069	0.2065	0.731
2.00	0.3328	0.3310	1.174
4.00	0.7057	0.6913	2.469
8.00b	1.585	1.590	5 608
<sup>b</sup> In solutions where	HNO <sub>3</sub> conch is greater that	a 8.00 mol dm <sup>-3</sup> , the io	date decomposed.
bIn solutions where	HNO <sub>3</sub> conch is greater that	a 8.00 mol dm <sup>-3</sup> , the io	date decomposed.
bIn solutions where	AUXILIARY	Nifformation	date decomposed.
bIn solutions where METHOD/APPARATUS/Pl	AUXILIARY	INFORMATION	date decomposed.
bIn solutions where METHOD/APPARATUS/PI AgIO <sub>3</sub> was added to HNO <sub>3</sub> stirred for one or two days Equilibrium was approached rated and undersaturated sid analyzed by reduction of Ag SO <sub>2</sub> . The precipitated AgI crucible and dried to consta care was taken to be sure th	AUXILIARY AUXILIARY ROCEDURE: solutions, and the mixtures in a thermostat at 25°C. I from both the supersatu- ies. The solutions were gIO <sub>3</sub> to AgI by means of was filtered in a Gooch nt weight at 120°C. Great hat the AgI coagulated.	(NFORMATION SOURCE AND PUR AgIO <sub>3</sub> was precipitat lized) Ag <sub>2</sub> SO <sub>4</sub> and K with hot water.	date decomposed. ITY OF MATERIALS: red from solutions of (recrystal- IO <sub>3</sub> . The precipitate was washed

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Li, N.C.C.; Lo, YT.	
(2) Nitric acid; HNO <sub>3</sub> ; [7697-37-2]	J. Am. Chem. Soc. <u>1941</u> , 63, 394-7.	
(2) Water; H <sub>2</sub> O; [7732-18-5]		
VARIABLES:	PREPARED BY:	
Concentration of nitric acid $T/K = 298$ , 303 and 308	H. Miyamoto	
EXPERIMENTAL DATA:		

HNO3 concn/mol dm-3	solubility of $AgIO_3$ (104mol dm <sup>-3</sup> ) as a function of temperature			
	25°C	30°C	35°C	
0	1.785	2.152	2.587	
0.001301	1.8297			
0.006503	1.949	2.373	2.844	
0.01410	2.070	2.520	3.045	
0.07050	2.660	3.256	3.922	
0.1213	3.040	3.750	4.537	
0.2528	3.820	4.738	5.688	
0.5050	5.027	6.350	7.718	
0.8738	6.522			

AUXI	LIARY	INFORMATION	

# METHOD/APPARATUS/PROCEDURE:

AgIO<sub>3</sub> crystals and HNO<sub>3</sub> solutions were placed in brown glass bottles coated inside with paraffin and closed with paraffined corks. The bottles were rotated in a thermostat at specified temperatures, and three solubility determinations were made for each HNO<sub>3</sub> solution at each temperature. The solubility of AgIO<sub>3</sub> was determined iodometrically by titration of 100 cm<sup>3</sup> aliquots of filtered saturated solution with 0.01 mol dm<sup>-3</sup> Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solutions which were frequently standardized by titration into potassium dichromate according to (1).

# SOURCE AND PURITY OF MATERIALS:

AgIO<sub>3</sub> prepd by mixing dil solutions of c.p. grade AgNO<sub>3</sub> and twice recrystallized KIO<sub>3</sub>. The ppt was aged for several days, washed repeatedly with conductivity water, and dried under vacuum at  $60^{\circ}$ C. HNO<sub>3</sub> slns were made by a series of dilutions from a stock sln standardized against pure sodium carbonate using methyl orange indicator.

## ESTIMATED ERROR:

Titrations accurate to  $\pm$  0.3 %. Soly: reproducibility not specified. Temp: precision  $\pm$  0.05 K.

#### **REFERENCES:**

 Kolthoff, I.M.; Lingane, J.J. J. Phys. Chem. <u>1938</u>, 42, 133. Silver lodate

COMPONENT	S:		ORIGINAL MEAS	UREMENTS:	
(1) Silver ioda	te; AgIO <sub>3</sub> ; [7783-97-3]		Ramette, R.W.		
(2) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]			J. Chem. Eng. Data <u>1972</u> , 17, 195-6.		
(3) Water; $H_2C$	D; [7732-18-5]				
VARIABLES:			PREPARED BY: H. Miyamoto, G.	Jancso, E.M. Woolley and	
T/K = 275 to	323		M. Salomon		
EXPERIMENT	TAL DATA:				
All solubilities	(S) determined in solution	ons containing 1 :	x 10 <sup>-4</sup> mol dm <sup>-3</sup> HC	CIO4.	
		solubili	ty		
	t/ºC	10 <sup>3</sup> mol	dm-3 -log K	s0 <sup>a</sup>	
	<b>`</b>	0.066	7 9 <b>2</b> 64		
	2	0.000	6.304 8 8 010		
	11	0.100.	0.010 7 7 600		
	20	0.145	7.089		
	25	0.179.	5 7.510		
	30	0.2148	7.354		
	40.2	0.3090	) 7.041		
	49.1	0.412	6.794		
* $K_{s0} = S^2 y_{\pm}^2$ were fitted by	using the relation <i>log</i> y <sub>±</sub> least squares to the follo	= $AI^{\frac{1}{2}}/(1 + I^{\frac{1}{2}})$ whowing smoothing e	ere the ionic streng equation.	th is $I = S + 0.0001$ . These	e K <sub>s0</sub> data
	log K <sub>s0</sub> = 8.9270 -	0.010953(T/K) -	3298.4/(T/K)		
Based on this	smoothing equation, the	following thermo	lynamic quantities v	were calculated.	
	٨G	лн	<b>AS</b>	ΔC-	
t/ºC	kcal mol <sup>-1</sup>	kcal mol-1	cal mol <sup>-1</sup>	K-1 cal mol-1 K-1	
<i>u,</i> c	Nour mor	Kour mor	••••		
0	10 577	14 236	13 47	-27	
25	10.252	13 520	10.96	-30	
50	10.009	12.741	8.45	-32	
AUXILIARY IN		FORMATION			
METUOD/AD		<b>F</b> •	SOURCE AND PU	DITY OF MATERIALS.	
A column 2 or	rakalUS/FROCEDUKI	bi ha waa nuanawad	Countailing A gIO	repared by path from the	following
A column 5 cl	n nigh in a 4-inin i.u. tu ) amustala labalad with A	allo This	crystamic Agios	shalad with Agl10 NH OH	KIO.
Troin 4 g Agic	of the state of th	agene. This	and 2-bydroxyethylacetate. This mixture was allowed		
column was ja	cketed with a larger tube	e carrying circu-	and 2-nydroxyetnylacetate. This mixture was anowed		
lating water ir	om a constant temperatu	re bain. A	to stand for 2 weeks, the Agios fedissolved in ad Wis,		
solution of 0.0	001 mol dm <sup>-s</sup> HClO <sub>4</sub> wa	s forced through	and pptd with add	n of $HClO_4$ . All chemicals	were
the column, an	id a test tube was used to	o collect about 1	A.R. grade, and w	ater was redistilled and stol	rea in
gram of satura	ted solution which was t	hen weighed and	borosilicate glass 'j	ugs.'	
counted. Back	ground was about 200 cj	om, and samples			
for analyses w	ere counted to give 10 <sup>5</sup> t	o 10 <sup>6</sup> total			
counts (10 to 1	00 minutes). The analys	es were carried	· · · · · · · · · · · · · · · · · · ·		
out on a weigh	it basis, and conversion t	o volume units	ESTIMATED ERROR:		
made by use o	f literature densities (1)	for pure $H_2O$ .	Soly: nothing specified.		
Thermometers	checked against NBS cal	ibrated ther-	Temp: accuracy pr	obably ± 0.1 K (compilers).	
mometers. All volumetric glassware was calibrated.					
Standards for g	gamma counting were tal	ken by weight			
from stock solu	utions prepd by weighing	g dried samples	<b>REFERENCES:</b>		
of the radioact	ive ppt followed by diss	olving in NaCN			
solution. Cour	ting times were accurate	to ± 0.1	I. Chang, T.; Chier	n, J. J. Am. Chem. Soc. <u>1</u>	<u>941, 63,</u>
seconds. Auth	ors state that repeated so	lubility deter-	1709.		
minations at ea	ich temperature gave ass	urance of repro-			
ducibility but	numerical information n	ot given.			

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COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Ricci, J.E.; Amron, I.		
(2) Iodine oxide; I <sub>2</sub> O <sub>5</sub> ; [12029-98-0]		J. Am. Chem. Soc. <u>1951</u> , 73, 3613-8.		
(3) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:		PREPARED BY:		
T/K = 298 and 318		M. Salomon		
EXPERIMENTAL DATA:		, I		
	The AgIO3-I2O5-H	I <sub>2</sub> O system at 25.0°C		
mass % I <sub>2</sub> O <sub>5</sub>	sin density/g cr	m <sup>-3</sup> solid phase <sup>a</sup>		
19.51	1.203	A		
36.89	1.455	A		
48.64		Α		
52.11		A, A•B		
52.09		A, A•B		
54.12		A•B		
55.20	1.864	A•B		
59.78	1.99 <sub>9</sub>	A•B		
63.04	2.12	A•B		
63.72		A•B		
64.69	2.18	A•B		
65.70	2.22	A•B		
67.82		A•B		
68.85		A•B		
69.86		A•B		
71.00	2.45	A•B		
71.42		A•B		
71.54 <sup>b</sup>	2.48	A·B, B·W		
		B•W		

<sup>a</sup>Solid phases:  $A = AgIO_3$ ,  $B = I_2O_5$ ,  $W = H_2O$ <sup>b</sup>This is point b on the phase diagram given on the next page and is the average of four.

continued....

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# AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method. Solutions prepd from AgIO <sub>3</sub> , HIO <sub>3</sub>	Commercial AgIO <sub>3</sub> was purified by recrystallization or
and H <sub>2</sub> O and equilibrated for one week as described in	by washing with warm dilute nitric acid and water.
the compilation of these authors' study of the AgIO <sub>3</sub> -	The product was dried at 100°C. The purity of the
AgNO <sub>3</sub> -H <sub>2</sub> O system. Solutions sampled with delivery	solid was determined by both iodometric titration
pipets at low concns and with specific gravity pipets at	(99.9-100.0 %) and by gravimetric silver determination
high concns. Analyses of total acid and total iodate	(99.6 %).
yielded identical results (within 1/1000) indicating the	
absence of AgIO <sub>3</sub> in the satd solutions. The phase	HIO <sub>3</sub> (source not specified) ground, dried at room temp
diagram for 298.2 K is given on the following page,	for 1 week over anhydrone, and analyzed as 100.0 %
and the 318.2 K phase diagram is very similar.	pure by iodometric titrn and by titrn with stnd NaOH
	solution.
From the phase diagram the formation of the 1:1	ESTIMATED ERROR:
complex is clear and formed more rapidly near point b	
(congruently satd with the compound and HIO <sub>3</sub> ) than	Soly: precision ± 0.01 mass % (compiler).
near point a (the solution incongruently satd with	Temp: precision probably $\pm$ 0.05 K (compiler).
$AgIO_3$ and the compound). This difference is due to	
poly-iodate ions whose concn increases with HIO <sub>3</sub>	
concn.	

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C	OMPO	NENTS	:	
(1)	Silver	iodate;	AgIO <sub>3</sub> ;	[7783-97-3]

(2) Iodine oxide; I<sub>2</sub>O<sub>5</sub>; [12029-98-0]

ORIGINAL MEASUREMENTS: Ricci, J.E.; Amron, I.

J. Am. Chem. Soc. 1951, 73, 3613-8.

(3) Water; H<sub>2</sub>O; [7732-18-5]

# EXPERIMENTAL DATA: (continued.....)

## The AgIO<sub>3</sub>-I<sub>2</sub>O<sub>5</sub>-H<sub>2</sub>O system at 45.0°C

mass % I2O5	sln density/g cm <sup>-3</sup>	solid phase <sup>a</sup>
34.55	1.410	А
40.40	1.512	Α
46.43	1.637	А
47.44	1.653	А
48.42	1.681	Α
49.53	1.702	А
49.95		A, A•B
49.94		A, A•B
49.94		A, A•B
50.45	1.727	A•B
50.99	1.737	A•B
51.55		A•B
52.73		A•B
54.24	1.82 <sub>0</sub>	A•B
55.30	1.849	A•B
56.29		A•B
57.44	1.911	A•B
61.10		A•B
66.74		A•B
70.64	2.42	A•B
71.69	2.47	A•B
72.05		A•B
73.24	2.54	A•B
74.02	2.58	A•B, B•W
73.89		B•W

<sup>a</sup>Solid phases:  $A = AgIO_3$ ,  $B = I_2O_5$ ,  $W = H_2O_5$ 



Silver	lodate 199			
COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Kolthoff, I.M.; Chantooni, M.K.			
(2) Tetraethylammonium iodate; C <sub>8</sub> H <sub>20</sub> NIO <sub>3</sub> ; [61327-93-3]	J. Phys. Chem. <u>1973,</u> 77, 523-6.			
(3) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
Concentration of $(C_2H_5)_4$ NIO <sub>3</sub> T/K = 298	H. Miyamoto			
EXPERIMENTAL DATA:	4			
(1) Results based on potentiometric measurements.	·			
concn of				
$(C_2H_5)_4NIO_3$ $E_1$ -lo	g K <sub>s0</sub> 10 <sup>8</sup> K <sup>0</sup> s0 <sup>a</sup>			
mol dm- <sup>3</sup> mV	mol <sup>2</sup> dm <sup>-6</sup>			
0.00115 152 7	5 28			
	5 2.8 <sub>2</sub>			
	J4 2.88			
	$4_8$ $3.3_1$			
0.00870 -190 7.	.37 4.27			
averages: 7. *Calculated by compiler.	5 3.3			
(2) Results based on conductometric measurements.				
The authors reported $-\log K_{s0} = 7.5_5$ from a measured electrolytic conductance of $1.5_3 \times 10^{-5}$ S cm <sup>-1</sup> . The compiler calculates $K_{s0} = 2.8 \times 10^{-8}$ from this value.				
AUXILIARY IN	FORMATION			
ΜΕΤΗΛΝ / Α ΡΡΑΡΑΤΙΙς / ΡΡΑΓΕΝΙ ΙΡΕ	SOURCE AND PURITY OF MATERIALS			
METHOD/AFFARATOS/FROCEDORE:	SOURCE AND FORTH OF MATERIALS.			
The solubility product of AgIO <sub>3</sub> in water was determined potentiometrically by measuring emf values of the following cell:	AgIO <sub>3</sub> prepared in the "conventional way." Tetraethy- lammonium iodate prepd by neutralization of aq $(C_2H_5)_4$ NOH with Merck reagent grade HIO <sub>3</sub> . The resulting solution was evaporated to dryness, and the			
$Ag,AgIO_3   salt(c_1)    AgNO_3(c_2)   Ag [1]$	solid recrystallized from ethyl acetate. The purity of the product was 99.3 % (detd iodometrically).			
In the above eqn, "salt" = tetraethylammonium iodate at concentration $c_1$ , $c_2 = 0.00947$ mol dm <sup>-s</sup> , and $\parallel$ is a salt bridge containing 0.01 mol dm <sup>-s</sup> tetraethylammoni- um picrate.	Salts were dried in vacuum at 70°C for 3 hours. Electrodes were prepared electrolytically (1).			
Details of the conductivity cell and method are given in reference (2).	ESTIMATED ERROR: Emf values: precision within $\pm 2 \text{ mV}$ .			

Temp: not given.

**REFERENCES:** 

 Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc. <u>1965</u>, 87, 4428: Ives, D.J.; Janz, G.J. Reference Electrodes. Academic Press, NY. <u>1961</u>, page 207.

2. Kolthoff, I.M.; Bruckenstein, S.; Chantooni, M.K.

J. Am. Chem. Soc. 1961, 83, 3927.

COMPONENTS:	ORIGINAL MEASUREMENTS:			
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Keefer, R.M.; Reiber, H.G.			
(2) Glycine; $C_2H_5NO_2$ ; [56-40-6]	J. Am. Chem. Soc. <u>1941</u> , 63, 689-92.			
(3) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
Concentration of glycine				
T/K = 298	H. Miyamoto			
EXPERIMENTAL DATA:				
glycine content	solubility			
mol kg-1a	10 <sup>3</sup> mol kg <sup>-1</sup>			
0	0.1794 <sup>b</sup>			
0.02510	0.1859			
0.03768	0.1880			
0.05026	0.1916			
0.07536	0.1971			
0.08234	0.1979			
0.10075	0.2020			
0.1238	0.2082			
0.1654	0.2181			
0.2042	0.2223			
<sup>a</sup> Probably moles of glycine per kg water, but not explicit	ty stated.			
<sup>b</sup> Authors give a reproducibility of $\pm 4 \ge 10^{-7}$ mol kg <sup>-1</sup> f	or this data point.			
The above solubility data were interpreted in terms of the	he following equilibrium.			
$Ag(C_2H_5NO_2)^* = Ag^+ + C_2H_5NO_2 \qquad K_d$				
The thermodynamic dissociation constant $K_d$ was given	as 5.28 x 10 <sup>-5</sup> (probably based on mol kg <sup>-1</sup> units).			
AUXILIARY IN	NFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The procedure followed is described in ref. (1). An	AgIO <sub>3</sub> prepared by dropwise addition of 0.15 mol dm <sup>-3</sup>			
excess of air-dried AgIO, was placed in glass-stop-	solutions of AgNO <sub>3</sub> and KIO <sub>3</sub> into 200 cm <sup>3</sup> of water.			
pered Pyrex flasks, and 200 cm <sup>3</sup> of the glycine solution	The precipitate was allowed to stand in the mother			
added. The flasks were placed in a thermostat at 25°C	liquor for three days and then filtered, washed, and			
and rotated for at least 12 hours. Aliquots for	dried at room temperature. C n. grade glycine was			
analyses were removed with a pinet by applying	recrystallized twice from water by the addition of			
nessure The ninets were fitted with an ashestos filter	ethanol (1)			
The solubility of A IO- was determined by indometric				
titration				
	ESTIMATED ERROR:			
	Soly: see footnote b above.			
	Temp: precision probably ± 0.01 K (compiler).			
	REFERENCES:			
	1. Keefer, R.M.; Reiber, H.G.; Bisson, C.S. J. Am.			
	Chem. Soc. 1940, 62, 2951.			

Silver Iodate 20				
COMPONENTS	ORIGINAL MEASUREMENTS.			
(1) Silver indate: $A \not = IO_{0}$ : [7783-97-3]	Keefer, R.M.: Reiber, H.G.			
(1) Briter regard, 118103, [1000 37 5]				
(2) $DL$ -Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub> ; [302-72-7]	J. Am. Chem. Soc. <u>1941</u> , 63, 689-92.			
(3) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
Concentration of alanine				
1/K = 298	H. Miyamoto			
EVDEDIMENTAL DATA.	L			
EALENIMENTAL DATA.				
alanine content	solubility			
mol kg-1a	10 <sup>3</sup> mol kg <sup>-1</sup>			
0	0.1794ь			
0.02511	0.1892			
0.03740	0.1924			
0.05616	0.2001			
0.07557	0.2064			
0.10092	0.2155			
*Probably moles of glycine per kg water, but not explicit	ity stated.			
<sup>b</sup> Authors give a reproducibility of $\pm 4 \times 10^{-7}$ mol kg <sup>-1</sup> f	for this data point.			
The above solubility data were interpreted in terms of t	he following equilibrium.			
$Ag(C_{3}H_{7}NO_{2})^{+} = Ag^{+} +$	$C_3H_7NO_2$ $K_d$			
The thermodynamic dissociation constant $K_d$ was given as 1.3/ x 10 <sup>-9</sup> (probably based on mol kg <sup>-1</sup> units).				
AUXILIARY II	NFORMATION			
METHOD/APPAPATUS/PROCEDURE:	SOURCE AND PUBITY OF MATERIALS.			
METHOD/ATTARATOS/TROCEDORE.	SOURCE AND FORTH OF MATERIALS:			
The procedure followed is described in ref $(1)$ An	Agios prepared by dronwise addition of 0.15 mol dm-3			
excess of air-dried AgIO <sub>2</sub> was placed in glass-ston-	solutions of AgNO <sub>2</sub> and KIO <sub>2</sub> into 200 cm <sup>3</sup> of water			
nered Purey flasks, and 200 cm <sup>3</sup> of the alapine solution	The precipitate was allowed to stand in the mother			
added The flasks, and 200 cm <sup>-</sup> of the alarme solution	liquor for three days and then filtered washed and			
added. The flasks were placed in a thermostat at 25°C	dried at room temperature. C n grade DI alarina was			
and rotated for at least 12 hours. Anduois for	recrystallized twice from water by the addision of			
analyses were removed with a piper by applying	ethanol (1)			
The solubility of A D. was determined by indemotion	ethanor (1).			
The solubility of AgiO <sub>3</sub> was determined by iodometric				
	ESTIMATED ERROR:			
	Soly: see footnote b above.			
	Temp: precision probably ± 0.01 K (compiler).			
	REFERENCES:			
	1. Keefer, R.M.; Reiber, H.G.; Bisson, C.S. J. Am.			
	Chem. Soc. <u>1940</u> , 62, 2951.			

202 5	Silver locat	e		
COMPONENTS:	ORIG	INAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Vost	ourgh, W.C.; McClure, R.S.		
(2) Ammonium nitrate; NH4NO3; [6484-52-2]	ł			
(3) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7]	J. A	m. Chem. Soc. <u>1943</u> , 65, 1060-3.		
(4) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREI	ARED BY:		
Concns of NH <sub>3</sub> and NH <sub>4</sub> NO <sub>3</sub>				
T/K = 298	H. N	fiyamoto		
EXPERIMENTAL DATA:				
NH4NO3 concn total	l NH <sub>3</sub> concn	AgIO <sub>3</sub> solubility		
mmol kg-1 m	nmol kg-1	mmol kg <sup>-1</sup>		
0.1018	0.126	0.225		
0.1018 0.120		0.239		
0.842		0.343		
0.0501	4.10	1.302		
0.1020 8.23		2.59		
The dissociation constant, K <sub>d</sub> , for				
$Ag(NH_3)^+ = Ag$	+ + NH3			
	4 - 10 F	1 1 0		
was calculated by the authors who reported $K_d =$	4 x 10-8 mo	1 dm-•.		
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOU	RCE AND PURITY OF MATERIALS:		
For complete details on calculation of K <sub>n</sub> and	Com	plete details given in the compilation by Derr and		
experimental techniques, see the compilation by Derr		urgh cited at left.		
and Vosburgh for the following system.				
AgIO <sub>3</sub> -Ni(NO <sub>3</sub> ) <sub>2</sub> -NH <sub>4</sub> NO <sub>3</sub> -NH <sub>3</sub> -water				

COMPONENTS:		ORIGINAL MEA	SUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Mottola, A.			
(2) Ammonium nitrate; $NH_4NO_3$ ; [6484-52-2]		Chimine (Miles)	1040 4 422	7	
(4) Water; $H_2O$ ; [7732-18-5]		Chimica (Milan). <u>1949</u> , 4, 422-7.			
VARIABLES:	ı	PREPARED BY:			
$\frac{T/K}{T} = 298$		E.M. Woolley			
EXPERIMENTAL DATA:					
concentration of $NH_4NO_3/mol \ dm^{-3}$	0.	0	0	0.730	
NH <sub>3</sub> concentration/mol dm <sup>-3</sup>	0.418	0.240	0.192	0.204	
AgIO3 solubility/mol dm-3	0.1367	0.0769	0.0612	0.0769ª	
*Calcd by compiler from the volume of solut	ion given an	d the mass of A	gCl weighed.		
AUX	LILIARY INI	FORMATION			
For complete details, see compilation of this	author's stud	y of the followi	ng 5-component	: system:	
AgIO <sub>3</sub> -Ni(	(NO <sub>3</sub> ) <sub>2</sub> -NH <sub>4</sub> N	NO3-NH3-water			

		3110				203
COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Lithium perchlorate: LiClO <sub>4</sub> ; [7791-03-9] (3) Lithium iodate; LiIO <sub>3</sub> ; [13765-03-2] (4) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL M Renier, J.J.; J. Am. Chen Energy Com	ORIGINAL MEASUREMENTS: Renier, J.J.; Martin, D.S. J. Am. Chem. Soc. <u>1956</u> , 78, 1833-7: U.S. Atomic Energy Comm. ISC-688, <u>1955</u> , 1-43.		
VARIABLES:			PREPARED	BY:		
Concentrations	of LiIO <sub>3</sub> and LiClO	4	I KEI AKED	<i>D</i> 1.		
T/K = 298.2, 3	08.2 and 323.2	•	H. Miyamoto	D		
EXPERIMENT. The solubility,	AL DATA: S, of AgIO <sub>3</sub> in LiIO	s solutions is given	n in the table belo	ow.		
t/ºC	10°S mol dm-3	[IO <sub>3</sub> <sup>-</sup> ] <sub>tot</sub> mol dm <sup>-3</sup>	у±ь	-1/2log K <sub>\$0</sub> c	10 <sup>6</sup> S <sub>calcd</sub> (eq. [8])	
25.0	37.0∎	0.000722	0.968	3.80	45.2	
	18.1 *	0.00187	0.951	3.76	18.2	
	7.03	0.00421	0.933	3,79	8.46	
	6.85×	0.00493	0.928	3.77	7.34	
	4.29ª	0.0101	0.903	3.72	3.86	
l	3.30	0.0110	0.899	3.77	3.59	
	3.05	0.0151	0.807	3.72	2.73	
	2.12	0.0249	0.863	3.70	1.84	
ļ.	1.13	0.0353	0.845	3.77	1.43	
	1.11	0.0848	0.795	3.61	1.00	
	0.978	0.1023	0.782	3.61	0.865	
]	0.993	0.1180	0.776	3.58	0.845	
	0.835	0.1540	0.761	3.57	0.849	
	0.915	0.2042	0.747	3.49	0.892	
	1.04	0.2580	0.733	3.43	0.975	
35.0	87.5	0.000693	0.970	3.62	99.7	
Į	28.0	0.00272	0.943	3.59	27.2	
	15.1	0.00435	0.932	3.62	17.5	
	8.66ª	0.00780	0.914	3.63	10.4	
	7.68	0.0114	0.900	3.58	7.58	
	4.09	0.0266	0.860	3.55	3.80	
1	2.71	0.0398	0.837	3.56	2.90	
	2.46	0.0520	0.821	3.54	2.48	
	1.99	0.0836	0.795	3.49	1.99	
	1.73	0.1203	0.782	3.49	1.88	
	1.89	0.1068	0.781	3.46	1.86	
	1.69	0.1279	0.771	3.44	1.81	
	1.80	0.1682	0.757	3.38	1.80	
ļ	1.74	0.2292	0.740	3.33	1.91	
	1.66	0.2523	0.737	3.32	1.96	
	1.97	0.2700	0.732	3.28	2.01	
50.0	217	0.00914	0.966	3.37	206	
	65.6	0.00283	0.942	3.40	70.9	
	23.0ª	0.00800	0.911	3.40	27.8	
	19.9ª	0.0109	0.899	3.38	21.5	
	13.7	0.0177	0.880	3.37	14.4	
	7.26	0.0395	0.837	3.35	8.15	
	3.64	0.1008	0.783	3.33	5.12	
	4.05	0.1317	0.770	3.25	4.75	
	4.24	0.1580	0.760	3.21	4.62	
	4.34	0.2660	0.732	3.11	4.70	
1						

\*These values were obtained with silver of specific activity of 1.98 x 10<sup>5</sup> counts/min mg. All other values were obtained with silver of specific activity of 2.89 x  $10^5$  counts/min mg.

bThese values are mean ionic activity coefficients for singly charged ions obtained by interpolation from the table of  $y_{\pm}$  values presented by Crouthamel and Martin (1). cFrom K<sub>\*0</sub> = S[IO<sub>3</sub>-]<sub>tot</sub>y<sup>2</sup>.

1

continued......

#### Silver lodate

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Renier, J.J.; Martin, D.S.
(2) Lithium perchlorate: LiClO <sub>4</sub> ; [7791-03-9]	J. Am. Chem. Soc. <u>1956</u> , 78, 1833-7: U.S. Atomic
(3) Lithium iodate; LiIO <sub>3</sub> ; [13765-03-2]	Energy Comm. ISC-688, <u>1955</u> , 1-43.
(4) Water; H <sub>2</sub> O; [7732-18-5]	Energy Comm. ISC-688, <u>1955</u> , 1-43.

# EXPERIMENTAL DATA: (continued.....)

The solubility, S, of AgIO<sub>3</sub> in aqueous  $LiIO_3 + LiCIO_4$  solutions of constant ionic strength = 1.00 mol dm<sup>-3</sup> is given in the table below.

	106S	[IO <sub>3</sub> -] <sub>tot</sub>	10 <sup>6</sup> S <sub>calcd</sub>
t/ºC	mol dm-3	mol dm-3	(eq. [8])
25.0	90.2	0.000940	89.5
	35.4	0.00248	34.0
	14.5	0.00540	15.6
	9.05	0.0103	8.30
	1.96	0.0501	1.93
	1.68	0.0634	1.60
	1.38	0.1001	1.21
	0.885	0.2000	1.04
	1.04	0.298	1.13
	1.14	0.400	1.31
	1.33	0.492	1.49
	1.44	0.596	1.71
	2.27	0.099	1.94
	2.48	0.734	2.00
	2.30	0.998	2.03
35.0	198	0.000900	193
	64.3	0.00265	66.1
	34.4	0.00544	32.4
	15.9	0.0110	16.3
	6.52	0.0263	7.13
	4.05	0.0400	4.93
	4.15	0.0505	4.06
	3.30	0.0039	3.33
	2.58	0.101	2.30
	2.32	0.200	2.14
	2.45	0.303	2.28
	2.50	0.501	2.57
	3.67	0.605	3.29
	4.19	0.707	3.78
	3.48	0.772	3.95
50.0	409	0.00107	400
	146	0.00285	151
	71.5	0.00583	74.7
	40.1	0.0110	40.4
	18.3	0.0253	18.6
	11.3	0.0414	12.1
	9.72	0.0515	10.2
	7.95	0.0694	8.22
	6.21	0.1030	6.22
	5.31	0.207	5.12
	6.35	0.322	5.21
	5.73	0.412	5.56
	5.96	0.507	6.05
	7.30	0.745	7.49
	8.35	0.800	7.84
	7.34	0.810	7.91
	8.96	0.998	9.16
		contin	ued

COMMENTS AND/OR ADDITIONAL DATA: (continued) The saturated solutions are satisfactorily described in terms of the following equilibria: $AglO_3(s) = Ag^+ + IO_3^- K_{so} = [Ag^+][IO_3^-] [1]$ $Ag^+ + IO_3^- = AglO_3(sln) \beta_1 = [AglO_3(sln)]/[Ag^+][IO_3^-] [2]$ $Ag^+ + 2IO_3^- = Agl(O_3)_2^- \beta_2 = [Ag(IO_3)_2^-]/[Ag^+][IO_3^-]^2 [3]$ The thermodynamic equilibrium constants are defined by $K_{s0}^0 = K_{s0}y_{\pm}^2$ [4] $\beta_1^0 = \beta_{1}y_0/K_{s0}^0$ [5] $\beta_2^0 = \beta_2y_2/([IO_3^-]K_{s0}^0)$ [6] The total solubility of silver iodate is $S = [Ag^+ + [AgIO_3(sln)] + [Ag(IO_3)_2^-]$ [7] Substituting the equilibrium constants, eq. [7] becomes $S = K_{s0}/[IO_3^-] + \beta_2K_{s0} + \beta_2K_{s0}[IO_3^-]_{tot} + \beta_2K_{s0}(IO_3^-]_{tot}]^{1/2}$ [9] Plotting the left hand side of eq. [9] against [IO_3^-]_{1/2} gives an intercept of $log(K_{s0}^0)^{1/2}$ . For the solubility of AgIO_3 in the solutions of constant ionic strength of 1.00 mol dm^-3, the total solubi treated similarly to eq. [9], but in the following form: $log(S[IO_3^-]_{tot})^{1/2} = log(K_{s0} + \beta_1K_{s0}(IO_3^-]_{tot} + \beta_2K_{s0}(IO_3^-]_{tot})^{1/2}$ [10] The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO_3 + LiCi solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $(S - K_{s0}/[IO_3^-] = \beta_1K_{s0} + \beta_2K_{s0}[IO_3^-]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.	tomic				
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$A_{g}^{+} + IO_{s}^{-} = AgIO_{3}(sin) \qquad \beta_{1} = [AgIO_{3}(sin)]/[Ag+][IO_{3}^{-}] \qquad [2]$ $A_{g}^{+} + 2IO_{3}^{-} = Ag(IO_{3})_{2}^{-} \qquad \beta_{2} = [Ag(IO_{3})_{2}^{-}]/[Ag+][IO_{3}^{-}]^{2} \qquad [3]$ The thermodynamic equilibrium constants are defined by $K_{s0}^{0} = K_{s0}Y_{2}^{2} \qquad [4]$ $\beta_{1}^{0} = \beta_{1}y_{0}/K_{s0}^{0} \qquad [5]$ $\beta_{2}^{0} = \beta_{2}y_{2}/([IO_{3}^{-}]K_{s0}^{0}) \qquad [6]$ The total solubility of silver iodate is $S = [Ag^{*} + [AgIO_{3}(sin)] + [Ag(IO_{3})_{2}^{-}] \qquad [7]$ Substituting the equilibrium constants, eq. [7] becomes $S = K_{s0}/[IO_{3}^{-}] + \beta_{1}K_{s0} + \beta_{2}K_{s0}[IO_{3}^{-}] \qquad [8]$ Assuming $[IO_{3}^{-}]_{tot} + \beta_{1}K_{s0} + \beta_{2}K_{s0}(IO_{3}^{-}]_{tot} + \beta_{2}K_{s0}(IO_{3}^{-}]_{tot})^{1/2} \qquad [9]$ Plotting the left hand side of eq. [9] against $[IO_{3}^{-}]_{tot} + \beta_{2}K_{s0}(IO_{3}^{-}]_{tot})^{1/2} \qquad [10]$ The solubility of AgIO_{3} in the solutions of constant ionic strength of 1.00 mol dm^{-3}, the total solubi treated similarly to eq. [9], but in the following form: $log(S[IO_{3}^{-}]_{tot})^{1/2} = log(K_{s0} + \beta_{1}K_{s0}(IO_{3}^{-}]_{tot} + \beta_{2}K_{s0}(IO_{3}^{-}]_{tot})^{1/2} \qquad [10]$ The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO_{3} + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $(S - K_{s0}/[IO_{3}^{-}]) = \beta_{1}K_{s0} + \beta_{2}K_{s0}[IO_{3}^{-}] \qquad [11]$	$AgIO_{3}(s) = Ag^{+} + IO_{3}^{-}$ $K_{so} = [Ag^{+}][IO_{3}^{-}]$ [1]				
$Ag^+ + 2IO_3^- = Ag(IO_3)_2^ \beta_2 = [Ag(IO_3)_2^-]/[Ag^+][IO_3^-]^2$ [3]The thermodynamic equilibrium constants are defined by $K_{40}^0 = K_{40}y_2^2$ [4] $\beta_1^0 = \beta_1y_0/K_{40}^0$ [5] $\beta_2^0 = \beta_2y_2/([IO_3^-]K_{40}^0)$ [6]The total solubility of silver iodate isS = [Ag^+ + [AgIO_3(sln)] + [Ag(IO_3)_2^-][7]Substituting the equilibrium constants, eq. [7] becomesS = K_{40}/[IO_3^-]_{40} + \beta_2K_{40}[IO_3^-][8]Assuming $[IO_3^-]_{40} + \beta_2K_{40}(IO_3^-]_{101} + \beta_2K_{40}(PO_3^-]_{101})^{1/2}$ [9]Plotting the left hand side of eq. [9] against $[IO_3^-]^{1/2}$ gives an intercept of $log(K_{40}^0)^{1/2}$ .For the solubility of AgIO_3 in the solutions of constant ionic strength of 1.00 mol dm <sup>-3</sup> , the total solubit treated similarly to eq. [9], but in the following form: $log(S[IO_3^-]_{101})^{1/2} = log(K_{40} + \beta_1K_{40}[IO_3^-]_{101} + \beta_2K_{40}[IO_3^-]_{101})^{1/2}$ [10]The solubility product $K_{40}$ is obtained from eq. [10] by the plot described above. In these LiIO_3 + LiCI solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above).(S - K_{40}/[IO_3^-]) [11]Values represent "probable errors."					
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Assuming $[IO_3^-]_{tot} = [IO_3^-]$ in the LiIO <sub>3</sub> solutions, eq. [8] can now be written as $log\{S[IO_3^-]_{tot}\}^{1/2} = log\{K_{*0}^0 + \beta_1 K_{*0}^0 [IO_3^-]_{tot} + \beta_2 K_{*0}^0 [IO_3^-]_{tot}\}^{1/2}$ [9] Plotting the left hand side of eq. [9] against $[IO_3^-]^{1/2}$ gives an intercept of $log(K_{*0}^0)^{1/2}$ . For the solubility of AgIO <sub>3</sub> in the solutions of constant ionic strength of 1.00 mol dm <sup>-3</sup> , the total solubil treated similarly to eq. [9], but in the following form: $log\{S[IO_3^-]_{tot}\}^{1/2} = log\{K_{*0} + \beta_1 K_{*0}[IO_3^-]_{tot} + \beta_2 K_{*0}[IO_3^-]_{tot}\}^{1/2}$ [10] The solubility product $K_{*0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $\{S - K_{*0}/[IO_3^-]\} = \beta_1 K_{*0} + \beta_2 K_{*0}[IO_3^-]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.					
$log\{S[IO_{3}^{-}]_{tot}\}^{1/2} = log\{K_{s0}^{0} + \beta_{1}K_{s0}^{0}[IO_{3}^{-}]_{tot} + \beta_{2}K_{s0}^{0}[IO_{3}^{-}]_{tot}\}^{1/2}$ [9] Plotting the left hand side of eq. [9] against $[IO_{3}^{-}]^{1/2}$ gives an intercept of $log(K_{s0}^{0})^{1/2}$ . For the solubility of AgIO <sub>3</sub> in the solutions of constant ionic strength of 1.00 mol dm <sup>-3</sup> , the total solubility treated similarly to eq. [9], but in the following form: $log\{S[IO_{3}^{-}]_{tot}\}^{1/2} = log\{K_{s0} + \beta_{1}K_{s0}[IO_{3}^{-}]_{tot} + \beta_{2}K_{s0}[IO_{3}^{-}]_{tot}\}^{1/2}$ [10] The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $\{S - K_{s0}/[IO_{3}^{-}]\} = \beta_{1}K_{s0} + \beta_{2}K_{s0}[IO_{3}^{-}]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.					
Plotting the left hand side of eq. [9] against $[IO_3^-]^{1/2}$ gives an intercept of $log(K_{s0}^0)^{1/2}$ . For the solubility of AgIO <sub>3</sub> in the solutions of constant ionic strength of 1.00 mol dm <sup>-3</sup> , the total solubility treated similarly to eq. [9], but in the following form: $log(S[IO_3^-]_{tot})^{1/2} = log(K_{s0} + \beta_1 K_{s0}[IO_3^-]_{tot} + \beta_2 K_{s0}[IO_3^-]_{tot})^{1/2}$ [10] The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained from above). $\{S - K_{s0}/[IO_3^-]\} = \beta_1 K_{s0} + \beta_2 K_{s0}[IO_3^-]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.	$log\{S[IO_3^-]_{tot}\}^{1/2} = log\{K_{s0}^0 + \beta_1 K_{s0}^0 [IO_3^-]_{tot} + \beta_2 K_{s0}^0 [IO_3^-]_{tot}\}^{1/2} $ [9]				
For the solubility of AgIO <sub>3</sub> in the solutions of constant ionic strength of 1.00 mol dm <sup>-3</sup> , the total solubility treated similarly to eq. [9], but in the following form: $log\{S[IO_3^-]_{tot}\}^{1/2} = log\{K_{s0} + \beta_1K_{s0}[IO_3^-]_{tot} + \beta_2K_{s0}[IO_3^-]_{tot}\}^{1/2}$ [10] The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $\{S - K_{s0}/[IO_3^-]\} = \beta_1K_{s0} + \beta_2K_{s0}[IO_3^-]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.					
$log\{S[IO_3^-]_{tot}\}^{1/2} = log\{K_{s0} + \beta_1K_{s0}[IO_3^-]_{tot} + \beta_2K_{s0}[IO_3^-]_{tot}\}^{1/2} $ [10] The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). $\{S - K_{s0}/[IO_3^-]\} = \beta_1K_{s0} + \beta_2K_{s0}[IO_3^-]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below.	lity is				
The solubility product $K_{s0}$ is obtained from eq. [10] by the plot described above. In these LiIO <sub>3</sub> + LiCl solutions, the formation constants were obtained from a least squares treatment of eq. [11] (obtained fro above). { S - $K_{s0}/[IO_{5}^{-}]$ = $\beta_1 K_{s0} + \beta_2 K_{s0}[IO_{3}^{-}]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below. To values represent "probable errors."					
$\{S - K_{s0}/[IO_{S}^{-}]\} = \beta_1 K_{s0} + \beta_2 K_{s0}[IO_{S}^{-}]$ [11] Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below. You are represent "probable errors."	O4 m eq. [8]				
Values of the solubility products and formation constants obtained from eqs. [9]-[11] are given below. values represent "probable errors."					
	Γhe ±				
$10^8 K_{s0}^{0}$ $10^7 K_{s0}$ $10^7 \beta_1 K_{s0}$ $10^6 \beta_2 K_{s0}$					
(eq. [9])         (eq. [10])         (eq. [11])         (eq. [11])           t/°C         mol² dm²6         mol² dm³         mol² dm6					
$250$ $30 \pm 0.15$ $0.84 \pm 0.02$ $1.3 \pm 0.8$ $2.42 \pm 0.16$					
$35.0$ $6.3 \pm 0.3$ $1.74 \pm 0.04$ $4.1 \pm 1.2$ $4.29 \pm 0.28$					
50.0         17.4 ± 1.0         4.26 ± 0.10         15.8 ± 1.8         7.16 ± 0.33					

continued.....

equilibrium [3].

206 Silver	lodate
COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Lithium perchlorate: LiClO <sub>4</sub> ; [7791-03-9] (3) Lithium iodata LiO <sub>4</sub> (113765-02-01)	ORIGINAL MEASUREMENTS: Renier, J.J.; Martin, D.S. J. Am. Chem. Soc. <u>1956</u> , 78, 1833-7: U.S. Atomic
(4) Water; H <sub>2</sub> O; [7732-18-5] continued	Energy Comm. ISC-088, <u>1922</u> , 1-43.
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method. Excess tagged AgIO <sub>3</sub> and the various LiIO <sub>3</sub> or LiIO <sub>3</sub> + LiCIO <sub>4</sub> solutions placed in flasks which were sealed with paraffin wax, placed in a constant temperature bath, and continuously agitated. Mixtures were allowed to equilibrate for one week. The filtering apparatus, brought to the equilibrium temperature, was inserted into the flask and pressure applied until a suitable amount of clear liquid filtrate was obtained for analyses. The total concentration of iodate was determined by iodometric titration. The solubility of silver iodate was determined by a radioassay technique for <sup>110</sup> Ag.	LiIO <sub>3</sub> prepared by mixing aqueous solutions of Li <sub>2</sub> CO <sub>3</sub> and HIO <sub>3</sub> . Carbon dioxide was driven off by heating, and the precipitate recrystallized, filtered, washed and dried at 120°C for 24 hours. LiClO <sub>4</sub> was reagent grade (G.F. Smith Chem. Co.). <sup>110</sup> Ag was obtained from Oak Ridge National Laboratory. The irradiated Ag had been dissolved in 1.4 ml of 2 mol dm <sup>-3</sup> HNO <sub>3</sub> , and the radiochemical purity was in excess of 98 %. Stock solutions containing silver of a definite specific activity were prepared by adding aliquots of the original solution to dilute nitric acid solutions containing inactive AgNO <sub>3</sub> . The solutions were scavenged with Fe(OH) <sub>3</sub> and evaporated to dryness with an excess of HNO <sub>3</sub> . The tagged silver nitrate was then precipitated as AgCl, filtered and dissolved in concentrated ammonia solu- tion. The silver was then electroplated on a platinum gauze cathode, and the entire purification cycle was repeated. The silver was then dissolved in nitric acid, and tagged AgIO <sub>3</sub> prepared by mixing this purified AgNO <sub>3</sub> solution with aqueous LiIO <sub>3</sub> .
	<ul> <li>ESTIMATED ERROR:</li> <li>Soly: nothing specified, but "probable errors" in equilibrium constants given in the table on the previous page.</li> <li>Temp: precision ± 0.1 K.</li> <li>REFERENCES:</li> <li>1. Crouthamel, C.E.; Martin, D.S. J. Am. Chem. Soc. 1951, 73, 569.</li> </ul>

OMPONENTS: ) Silver iodate; ) Sodium chlori	AgIO <sub>s</sub> ; [7783-97- de: NaCl: [7647-	-3]  4-5]	ORIGINAL ME Erdey, L.; Ban	ASUREMENTS: 1yai, E.; Szabadvar	y, F.		
3) Sodium nitrate: NaNOa: [7631-99-4]		Acta Chim. Ac	Acta Chim. Acad. Sci. Hung. 1961 26 211-8				
) Sulfuric acid:	H2SO4: 17664-93	-91					
i) Water; $H_2O$ ; [7]	7732-18-5]						
ARIABLES:			PREPARED BY	<:			
oncentrations of xed at ~ 0.2 % ( /K = 298	MaCl and H <sub>2</sub> SO. (mass % ?).	; concn of NaNO <sub>3</sub>	E.M. Woolley	E.M. Woolley and H. Miyamoto			
XPERIMENTAL	DATA:				<u> </u>		
gIO <sub>3</sub> was equilible indicated amo	brated with H <sub>2</sub> SC ounts of NaCl.	4 solutions containi	ing a fixed amount	of NaNO <sub>3</sub> (appro	ximately 0.2 %) an		
[H-SO ]a	INaCil.	105(01-)	[[ <b>O</b> ]]	105[ A g+1	108K _b		
mol dm-3	mol dm-3	mol dm-3	mol dm-3	mol dm-3	mol <sup>2</sup> dm <sup>-6</sup>		
0	0.020000	11.4	0.019888	0.2	4		
	0.010000	5.8	0.009946	0.4	4		
	0.004000	2.4	0.003986	1.0	4.0		
	0.002000	1.2	0.002002	1.4	2.8		
	0.001000	0.9	0.001003	4.2	4.2		
0.005	0.020000	11.7	0.019887	0.4	8		
	0.010000	5.4	0.009953	0.7	7		
	0.004000	2.2	0.003990	1.2	4.8		
0.05	0.020000	7.4	0.019931	0.5	10		
0.00	0.010000	3.8	0.009970	0.8	8		
0.00			0.004000	1 2	5		
0.00	0.004000	0.9	0.004003	1,4	5		
0.5	0.004000 0.020000	0.9 2.8	0.004003	1.0	20		
0.5	0.004000 0.020000 0.010000	0.9 2.8 2.3	0.019982 0.009990	1.0 1.3	20 13		

# AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
An excess of AgIO <sub>3</sub> tagged with <sup>110</sup> Ag and 0.1 mol dm <sup>-3</sup> NaCl solution tagged with <sup>36</sup> Cl were added to vials. The volume was adjusted to 50 cm <sup>3</sup> with distilled water. One cm <sup>3</sup> of 10 % (by mass ?) NaNO <sub>3</sub> solution was added, and the mixtures equilibrated in a shaking thermostat, with intermittent vigorous agita- tion, for 2 to 3 hours. Equilibrated solutions were centrifuged and the liquid was counted with a liquid scintillation counting apparatus. Standards for radioac- tive comparison were made from the same tagged AgIO <sub>3</sub> and NaCl samples that were used in the experiments.	Tagged AgIO <sub>3</sub> was prepared by mixing AgNO <sub>3</sub> and KIO <sub>3</sub> solutions and washing the precipitate with distilled water. No further details given.
	ESTIMATED ERROR:
	Nothing specified.

# Silver lodate

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Potassium nitrate; KNO <sub>3</sub> ; [7757-79-1] (3) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7] (4) Water; H <sub>2</sub> O; [7732-18-5]			ORIGINAL MEASUREMENTS: Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am. Chem. Soc. <u>1941</u> , 63, 2670-4.			
EXPERIMENTAL L	DATA:					
total NH <sub>3</sub> concn	KNO3 concn	solubilitya	density	ionic strength	$10^8 K^{I_P}$	
mol kg <sup>-1</sup>	mol kg <sup>-1</sup>	mmol kg-1	kg dm-3	mol dm-3	mol <sup>2</sup> dm <sup>-6</sup>	
0.03619	0.0403	11.48	1.001	0.0524	5.99	
0.01245	0.0998	4.049	1.003	0.1042	5.83	
0.03628	0.1424	12.12	1.007	0.1551	5.94	
Solubilities determi	ined by analyses of	total iodate conc	entration.			
<sup>b</sup> For definition of <b>k</b>	K <sub>I</sub> , see reference bel	ow.				
·····		AUXILIARY I	NFORMATION	······································		
METHOD/APPARATUS/PROCEDURE:			SOURCE AND	PURITY OF MATER	141.5	

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Complete details on the definition and computation of	Reagent grade KNO <sub>3</sub> was recrystallized and dried at
$K_I$ and all experimental information given in the	110°C. For additional details, see the compilation of
compilation of these authors' study of the following	the system given on the left.
system:	
AgIO <sub>3</sub> -NH <sub>3</sub> (aq)-water	

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Ammonium nitrate; NH <sub>4</sub> NO <sub>3</sub> ; [6484-52-2] (3) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7] (4) Water; H <sub>2</sub> O; [7732-18-5]		ORIGINAL MEASUREMENTS: Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am. Chem. Soc. <u>1941</u> , 63, 2670-4.			
VARIABLES: Concentrations of $NH_3$ and $NH_4NO_3$ T/K = 298		PREPARED BY: H. Miyamoto			
EXPERIMENTAL I	DATA:		·····		
total NH <sub>3</sub> concn mol kg <sup>-1</sup>	NH <sub>3</sub> NO <sub>3</sub> concn mol kg <sup>-1</sup>	solubility¤ mmol kg-1	density kg dm- <sup>3</sup>	ionic strength mol dm <sup>-3</sup>	108K <sub>1</sub> b mol² dm-6
0.03677	0.0099	11.54	0.999	0.0214	6,17
0.03599	0.0102	11.25	0.998	0.0215	6.05
0.01277	0.0200	4.002	0.997	0.0240	6.18
0.01403	0.0503	4.515	0.998	0.0548	6.17
0.03615	0.0694	11.87	1.001	0.0813	6.01
0.01347	0.1301	4.544	1.001	0.1346	6.02
0.03626	0.1241	12.20	1.002	0.1363	6.03
<sup>a</sup> See footnotes a and	l b above.				
		AUXILIARY I	NFORMATION		
METHOD/APPARATUS/PROCEDURE: Complete details on the definition and computation of $K_I$ and all experimental information given in the compilation of these authors' study of the following system: AgIO <sub>3</sub> -NH <sub>3</sub> (aq)-water		SOURCE AND I Reagent grade N 110°C. For addi the system given	PURITY OF MATER $H_4NO_3$ was recrystant itional details, see the on the left.	HALS: llized and dried at e compilation of	

COMPONENTS:	, <sub>1</sub> ,	ORIGINAL MEASUREME	NTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Derr, P.F.; Vosburgh, W.C.		
(2) Magnesium nitrate; Mg(N(	O <sub>3</sub> ) <sub>2</sub> ; [10377-60-3]			
(3) Ammonium nitrate; NH <sub>4</sub> N	10 <sub>3</sub> ; [6484-52-2]	J. Am. Chem. Soc. <u>1943</u> ,	65, 2408-11.	
(4) Aqueous ammonia; NH <sub>3</sub> (a	aq); [7664-41-7]			
(5) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:		PREPARED BY:		
Concus of $NH_3$ , $NH_4NO_3$ and $T/K = 298$	Mg(NO <sub>3</sub> ) <sub>2</sub>	H. Miyamoto and E.M. W	/oolley	
EXPERIMENTAL DATA:				
NH4NO3 concn mmol kg <sup>-1</sup>	total NH <sub>3</sub> concn mmol kg <sup>-1</sup>	total Mg(NO <sub>3</sub> ) <sub>2</sub> concn mmol kg <sup>-1</sup>	AgIO <sub>3</sub> solubility mmol kg <sup>-1</sup>	
3.89	3.561	1.005	1.165	
7.94	8.09	4.028	2.780	
4.00	16.17	4.028	5.52	
Only the monammine comple dissociation of this complex, constants for dissociation of $A$ $K_1 = 1.2$ , 1.6 and 1.2 mol 1	x Mg(NH <sub>3</sub> )++ was assum K <sub>1</sub> , is "in the vicinity of Ag(NH3)+, Ag(NH <sub>3</sub> ) <sub>2</sub> + as kg <sup>-1</sup> , respectively, for th	ted to form, and the equilibria or unity." Actual calculations b and AgIO <sub>3</sub> (sln) along with mate the above three measured solub.	um constant for the pased on known equilibrium erial balance equations gives ilities.	

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: For complete details on calculation of $K_n$ and experimental techniques, see the compilation by Derr and Vosburgh for the following system.	SOURCE AND PURITY OF MATERIALS: AR grade Mg(NO <sub>3</sub> ) <sub>2</sub> used to prep a stock sln which was analyzed with 8-hydroxyquinoline. Additional details given in the compilation of Derr and Vosburgh's study cited on the left.		
AgIO <sub>3</sub> -Ni(NO <sub>3</sub> ) <sub>2</sub> -NH <sub>4</sub> NO <sub>3</sub> -NH <sub>3</sub> -water			

COMPONENTS:	ORIGIN	AL MEASURE	MENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Mottola, A.			
(2) Magnesium sulfate; MgSO <sub>4</sub> ; [7487-88-9]				
(3) Ammonium sulfate; (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> ; [7783-20-2]	Chimica	(Milan). <u>1949</u>	2, 4, 422-7.	
(4) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7]				
(5) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:	PREPAR	ED BY:		
Concn of NH <sub>3</sub> at fixed concns of MgSO <sub>4</sub> and	<b>D N</b> <i>C</i> <b>W</b>			
$(NH_4)_2SO_4$	E.M. WO	bolley and H. I	vilyamoto	
	I		······	
EXPERIMENTAL DATA:				
concentration of MgSO <sub>4</sub> /mol dm <sup>-3</sup>	0.125	0.125	0.125	
concentration of $(NH_4)_2SO_4/mol dm^{-3}$	0.125	0.125	0.125	
total NH <sub>3</sub> concentration/mol dm <sup>-3</sup>	0.251	0.167	0.0836	
AgIO <sub>3</sub> solubility/mol dm <sup>-3</sup>	0.0923	0.0576	0.0310	
AUXILIAR	Y INFORMAT	TION		
For complete details, see compilation of this author's	s study of the	following 5-c	omponent system:	
Tor complete details, see compliation of this duties t		ronowing b-c	omponent system.	

AgIO3-Ni(NO3)2-NH4NO3-NH3-water

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210 Silv	er Ic	odate			
COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Nickel nitrate; Ni(NO <sub>3</sub> ) <sub>2</sub> ; [13138-45-9] (3) Ammonium nitrate; NH <sub>4</sub> NO <sub>3</sub> ; [6484-52-2] (4) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7] (5) Water; H <sub>2</sub> O; [7732-18-5]	C	DRIGINAL I Mottola, A. Chimica (M	MEASUREN Ilan) <u>1949</u> ,	1ENTS: 4, 422-7.	
VARIABLES:	P	PREPARED	BY:	· · · · · · · · · · · · · · · · · · ·	
T/K = 298		H. Miyamot	0		
EXPERIMENTAL DATA:					
concentration of Ni(NO <sub>3</sub> ) <sub>2</sub> /mol dm <sup>-3</sup>	0.278	8	0.171	0.340	
concentration of NH <sub>4</sub> NO <sub>3</sub> /mol dm <sup>-3</sup>	0.215	5	0.763	0.763	
total NH <sub>3</sub> concentration/mol dm <sup>-3</sup>	1.777	7	0.505	1.446	
silver iodate solubility/mol dm-3	0.244	45	0.0481	0.0442	
AUXILIARY	í inf	FORMATIO	N		
METHOD/APPARATUS/PROCEDURE:	5	SOURCE AN	ND PURITY	OF MATERIALS:	
AgIO <sub>3</sub> crystals and a volume of $NH_4NO_3$ solution containing Ni(NO <sub>3</sub> ) <sub>2</sub> were placed in a bottle, and the ammonia solution added dropwise into the bottle fro a burette. The dropping of ammonia was stopped at the point of disappearence of the solid AgIO <sub>3</sub> . A portion of this solution and excess AgIO <sub>3</sub> were place in smaller rubber-stoppered flasks. These flasks wer shaken in a thermostat for 2 h. For determination o total silver concentration, the sample solution was precipitated with NH <sub>4</sub> Cl and the AgCl precipitate collected in a Gooch crucible, dried at 100°C, and weighed.	d f	AgIO3 prepa and KIO3. 1	red by mix: No other de	ing dilute solutions of A tails given.	gNO3
	I	ESTIMATEI	ERROR:	,	
	ľ	Nothing spec	cified.		
	   	REFERENC	ES:		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Derr, P.F.; Vosburgh, W.C.
(2) Nickel nitrate: Ni(NO <sub>3</sub> ) <sub>2</sub> : [13138-45-9]	
(3) Ammonium nitrate: NH NOo: [6484-52-2]	J. Am. Chem. Soc. 1943, 65, 2408-11.
(4) A substant matrice, NUT (as), [3664, 41, 7]	
(4) Aqueous ammonia; NH <sub>3</sub> (aq); [/004-41+/]	
(5) Water; $H_2O$ ; [7732-18-5]	
VARIABLES:	PREPARED BY:
Concns of NH <sub>3</sub> , NH <sub>4</sub> NO <sub>3</sub> and Ni(NO <sub>3</sub> ) <sub>2</sub>	
T/K = 298	H. Miyamoto and E.M. Woolley
EXPERIMENTAL DATA:	

#### total NH<sub>3</sub> concn NH<sub>4</sub>NO<sub>3</sub> concn total Ni(NO<sub>3</sub>)<sub>2</sub> concn AgIO<sub>3</sub> solubility mmol kg-1 mmol kg-1 mmol kg-1 mmol kg-1 116.1 5.28 9.97 0.806 105.4 7.83 9.96 1.175 107.7 10.41 9.97 1.597 102.5 15.69 9.96 2.511 70.5 21.00 9.96 3.591 100.9 21.13 9.96 3.643 100.9 21.19 9.96 3.684 101.1 41.77 19.98 5.525 101.0 31.27 9.96 5.956 101.1 41.69 9.97 8.565 101.1 42.73 9.97 8.822 101.2 53.15 9.98 9.78= 109.7 64.50 9.97 14.29 110.6 71.1 9.98 16.17 107.5 96.5 9.98 23.34 115.7 128.2 20.00 25.60 104.6 128.1 9.99 32:91

<sup>a</sup> This solution also contained 0.01014 mol kg<sup>-1</sup> KIO<sub>3</sub>.

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continued.....

AUXILIARY IN	IFORMATION
METHOD/APPARATUS/PROCEDURE: Solutions prepared by dilution of stock $Ni(NO_3)_2$ solution, stock $NH_3$ solution, a weighed quantity of $NH_4NO_3$ , and excess AgIO_3. Remaining procedure as in (1). 200 cm <sup>3</sup> aliquots of equilibrated solutions removed by forcing the solution through a filter and into a pipet by air pressure to avoid loss of $NH_3$ . The aliquots were delivered into excess standardized 0.1 mol dm <sup>-3</sup> HCl, and the excess HCl titrated with standardized 0.1 mol dm <sup>-3</sup> NaOH using methyl red indicator. The iodate content was determined iodomet- rically by titration with 0.01 mol dm <sup>-3</sup> thiosulfate solution.	SOURCE AND PURITY OF MATERIALS: AgIO <sub>3</sub> prepared by slow addition of AgNO <sub>3</sub> and KIO <sub>3</sub> solutions to water. After digestion on a hot plate for 24 h, the precipitate was washed and dried in air. Analysis after drying at 110°C agreed with the stoichiometry. Analytical reagent grade Ni(NO <sub>3</sub> ) <sub>2</sub> stock solution analyzed with dimethylglyoxime. Reagent grade NH <sub>4</sub> NO <sub>3</sub> dried in a vacuum desiccator. Ammo- nia solutions were prepared by dilution.
	ESTIMATED ERROR: Soly: reproducibility less than 0.2 %. Temp: not specified.
	REFERENCES: 1. Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am. Chem. Soc. <u>1941</u> , 63, 2670.

#### Silver Iodate

COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>8</sub> ; [7783-97-3] (2) Nickel nitrate: Ni(NO <sub>2</sub> )2: [13138-45-9]	Derr, P.F.; Vosburgh, W.C.	
<ul> <li>(3) Ammonium nitrate; NH<sub>4</sub>NO<sub>3</sub>; [6484-52-2]</li> <li>(4) Aqueous ammonia; NH<sub>3</sub> (aq); [7664-41-7]</li> <li>(5) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	J. Am. Chem. Soc. <u>1943</u> , 65, 2408-11.	

EXPERIMENTAL DATA: (continued.....)

Equilibrium constants,  $K_n$ , for reactions of the type

$$Ni(NH_3)_{n}^{**} = Ni(NH_3)_{n-1}^{**} + NH_3$$

were calculated from material balance equations, and from equilibrium constants for formation of  $Ag(NH_3)^+$ ,  $Ag(NH_3)_2^+$ , NiOH<sup>+</sup>, and  $AgIO_3(sln)$ . The following values of  $K_n$  were given.

n	K <sub>n</sub> /mol kg <sup>-1</sup>
1	0.0016
2	0.009
3	0.022
4	0.05ь
5	0.07ь
6	c

<sup>b</sup>These values were "assumed" in order to give satisfactory constancy in  $K_1$ ,  $K_2$ , and  $K_3$ .

 ${}^{\circ}Ni(NH_3)_6^{++}$  not formed in large enough amounts to allow estimation of K<sub>6</sub>.

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Copper sulfate; CuSO <sub>4</sub> ; [7758-98-7] (3) Ammonium nitrate; NH <sub>4</sub> NO <sub>3</sub> ; [6484-52-2] (4) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7]	ORIGINAL MEASUREMENTS: Mottola, A. Chimica (Milan) <u>1949</u> , 4, 422-7.			
(5) Water; $H_2O$ ; [7732-18-5] VARIABLES: Concns of NH <sub>3</sub> , NH <sub>4</sub> NO <sub>3</sub> and CuSO <sub>4</sub> T/K = 298	PREPAR H. Miya	ED BY: amoto and E.M	I. Woolley	
EXPERIMENTAL DATA:				
concentration of CuSO <sub>4</sub> /mol dm <sup>-3</sup>	0.100	0.0625	0.125	0.0637
concentration of NH <sub>4</sub> NO <sub>3</sub> /mol dm <sup>-3</sup>	0	0	0.730	0.730
total NH <sub>3</sub> concentration/mol dm- <sup>3</sup>	0.432	0.347	0.540	0.347
AgIO <sub>3</sub> solubility/mol dm <sup>-3</sup>	0.0755	0.073	0.0374	0.0460

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# AUXILIARY INFORMATION

For complete details, see compilation of this author's study of the following 5-component system:

AgIO<sub>3</sub>-Ni(NO<sub>3</sub>)<sub>2</sub>-NH<sub>4</sub>NO<sub>3</sub>-NH<sub>3</sub>-water

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) Zinc sulfate; ZnSO <sub>4</sub> ; [7733-02-0] (3) Ammonium nitrate; NH <sub>4</sub> NO <sub>3</sub> ; [6484-52-2] (4) Aqueous ammonia; NH <sub>3</sub> (aq); [7664-41-7] (5) Water; H <sub>2</sub> O; [7732-18-5]	ORIGIN Mottola Chimica	AL MEASURE , A. 1 (Milan) <u>1949</u>	EMENTS: , 4, 422-7.	
VARIABLES: Concns of NH <sub>3</sub> and ZnSO <sub>4</sub> at fixed NH <sub>4</sub> NO <sub>3</sub> concn $T/K = 298$	PREPARED BY: E.M. Woolley and H. Miyamoto			
EXPERIMENTAL DATA:				
concentration of ZnSO <sub>4</sub> /mol dm <sup>-3</sup> concentration of NH <sub>4</sub> NO <sub>3</sub> /mol dm <sup>-3</sup> total NH <sub>3</sub> concentration/mol dm <sup>-3</sup> AgIO <sub>3</sub> solubility/mol dm <sup>-3</sup>	0.125 0.734 0.627 0.0640	0.0625 0.734 0.293 0.0362	0.0313 0.734 0.1515 0.0206	

### AUXILIARY INFORMATION

For complete details, see compilation of this author's study of the following 5-component system:

AgIO<sub>3</sub>-Ni(NO<sub>3</sub>)<sub>2</sub>-NH<sub>4</sub>NO<sub>3</sub>-NH<sub>3</sub>-water

#### Silver Iodate

COMPONENTS:		ORIGINAL MEASUREM	ENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Derr, P.F.; Vosburgh, W.C.		
(2) Cadmium nitrate; Cd(NO <sub>3</sub> )	2; [10325-94-7]			
(3) Ammonium nitrate; NH <sub>4</sub> NO <sub>3</sub> ; [6484-52-2]		J. Am. Chem. Soc. <u>1943</u> ,	65, 2408-11.	
(4) Aqueous ammonia; NH <sub>3</sub> (a	q); [7664-41-7]			
(5) Water; H <sub>2</sub> O; [7732-18-5]				
VARIABLES:		PREPARED BY:		
Concns of NH <sub>3</sub> and NH <sub>4</sub> NO <sub>3</sub>				
T/K = 298		H. Miyamoto and E.M. V	Voolley	
EXPERIMENTAL DATA:				
NH4NO3 concn	total NH <sub>3</sub> concn	total Cd(NO <sub>3</sub> ) <sub>2</sub> concn	AgIO3 solubility	
mmol kg <sup>-1</sup>	mmol kg <sup>-1</sup>	mmol kg <sup>-1</sup>	mmol kg <sup>-1</sup>	
99.6	5.34	10.32	0.9185	
104.3	7.95	10.32	1.370	
107.3	10.55	10.32	1.847	
97.3	20.87	10.32	3.942	
Total NH <sub>3</sub> > 0.2 mol dm <sup>-3</sup> led	to a change in the solid	l phase. Equilibrium constan	ts, K <sub>n</sub> , for	
	$Cd(NH_3)_n^{++} = Cd(N)$	$(H_3)_{n-1}$ ++ + NH <sub>3</sub>		
calculated from materials bala $K_2 = 0.010$ , and $K_3 = 0.025$ (	nce equations (see below values of $K_2$ and $K_3$ as	v). Reported values in mol k sumed in order to obtain con	$g^{-1}$ units are $K_1 = 0.0027$ , stancy in $K_1$ ).	
	AUXILIARY	INFORMATION		
METHOD/APPARATUS/PRO	CEDURE:	SOURCE AND PURITY	OF MATERIALS:	
For complete details on calcul	ation of K <sub>n</sub> and	AR grade Cd(NO <sub>3</sub> ) <sub>2</sub> used	to prep stock sln which was	
experimental techniques, see t	he compilation by Derr	analyzed by evapn with e	xcess H <sub>2</sub> SO <sub>4</sub> and weighing the	
and Vosburgh for the following	ng system.	CdSO <sub>4</sub> . Additional detail	s given in the compilation of	

COMPONENTS:	ORIGIN	AL MEASURE	MENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Mottola	, A.		
<ul> <li>(2) Cadmium sulfate; CdSO<sub>4</sub>; [10124-36-4]</li> <li>(3) Aqueous ammonia; NH<sub>3</sub> (aq); [7664-41-7]</li> <li>(4) Water; H<sub>2</sub>O; [7732-18-5]</li> </ul>	Chimica (Milan). <u>1949</u> , 4, 422-7.			
VARIABLES:	PREPAR	RED BY:		
Concns of $NH_3$ and $CdSO_4$ T/K = 298	E.M. Woolley			
EXPERIMENTAL DATA:				
concentration of CdSO <sub>4</sub> <sup>a</sup> /mol dm <sup>-3</sup>	0.164	0.125	0.0566	
total NH <sub>3</sub> concentration/mol dm <sup>-3</sup>	1.343	1.20	0.712	
AgIOs solubility/mol dm-8	0.201	0.1028	0.1365	

 $AgIO_3\text{-}Ni(NO_3)_2\text{-}NH_4NO_3\text{-}NH_3\text{-}water$ 

Derr and Vosburgh's study cited on the left.

# AUXILIARY INFORMATION

For complete details, see compilation of this author's study of the following 5-component system:

AgIO<sub>3</sub>-Ni(NO<sub>3</sub>)<sub>2</sub>-NH<sub>4</sub>NO<sub>3</sub>-NH<sub>3</sub>-water

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver indate: AgIO <sub>6</sub> : [7783-97-3]		Monk, C.B.	
(2) Sodium hydroxide: NoOH: $[1310_73_2]$			
(2) Solution (2) $(2)$ Solution (2) $(2)$		Trans Faraday Soc 1051 46 20	07
$(4) W_{0,0} = 1 0 17722 19 51$		Italis. Faladay Soc. <u>1291</u> , 40, 29.	<i>4</i> - <i>1</i> .
$[(4)$ water; $H_2O$ ; $[7752-18-5]$			
NADIAR DE		DIVID A DVD DV/	
Concentrations of NaOH and glycine		FREFARED BI;	
T/K = 298.15		H. Miyamoto and E.M. Woolley	
EXPERIMENTAL DATA:			
total glycine concn tota	al NaOI	I concn solubility	
mol dm-3	mol dn	n-3 mol dm-3	•
0	0	1.78 x 10-4a	
0.01001	0.0021	3 653 x 10-4	
0.02244	0.0210	$4 545 \times 10^{-3}$	
0.04252	0.0428	6 10.23 x 10-3	
	0.0.0		
<sup>a</sup> Based on the solubility in pure water, the author (based on mol dm <sup>-3</sup> units). The solubility produc coefficient was calculated from eq. [1] below.	report et was c	ed the solubility product $K_{s0}$ as -lo alculated from $K_{s0} = [Ag+][IO_3-]y_{\pm}$	$pg K_{s0} = 7.5089$ <sup>2</sup> where the activity
$\log y_{\pm}^2 = -I^{1/2}/(1)$	i + I1/2}	- 0.2I [1]	
Values of $K_2 = [Ag(C_2H_5NO_2)][C_2H_4NO_2^-]/[Ag(C)] data, and the final value of K_2 was given as 4.1 p$	2H4NO x 10-4 r	2)2-] were determined from the exp nol dm-3.	perimental solubility
AUXILIA	ARY IN	FORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MAT	ERIALS:
The saturating column method was used where the basic glycine solution was passed through a colum containing $AgIO_3$ . The iodate estimations were mean by addition of excess solid KI to about 25 cm <sup>3</sup> of saturated solution followed by a large addition of The solution was then titrated with standard thios solution to a starch endpoint.	ne nn nade f the acid. sulfate	AgIO <sub>3</sub> crystals were formed by the dilute solutions of $KIO_3$ and AgNe of hot water. The product was we minimun quantity of dilute $NH_4O$ dryness on a water bath. The gran washed with dil HNO <sub>3</sub> and water. was dried in a vacuum oven at 90	e slow addition of O <sub>3</sub> to a large volume ashed, dissolved in a H, and evaporated to nular crystals were A.R. grade glycine <sup>0</sup> C for several hours.
		ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K. REFERENCES:	
		1. Monk, C.B. Trans. Faraday So	c. <u>1951,</u> 47, 285.

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216 Silv	er lodate
COMPONENTS; (1) Silver iodate; AglO <sub>3</sub> ; [7783-97-3] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) <i>DL</i> -Alanine; C <sub>3</sub> H <sub>7</sub> NO <sub>3</sub> ; [302-72-7] (4) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Monk, C.B. Trans. Faraday Soc. <u>1951</u> , 46, 292-7.
VARIABLES: Concentrations of NaOH and alanine T/K = 298.15	PREPARED BY: H. Miyamoto and E.M. Woolley
EXPERIMENTAL DATA:	
total alanine concn total N mol dm <sup>-3</sup> mol	aOH concn solubility dm <sup>-3</sup> mol dm <sup>-3</sup>
0 0 0.01007 0.0 0.01792 0.0 0.02742 0.0 PBased on the solubility in pure water, the author rep (based on mol dm <sup>-3</sup> units). The solubility product w coefficient was calculated from eq. [1] below.	$1.78 \times 10^{-4a}$ 0397 $1.306 \times 10^{-3}$ 1512 $4.75 \times 10^{-3}$ 2742 $8.38 \times 10^{-3}$ orted the solubility product $K_{s0}$ as $-log K_{s0} = 7.5089$ as calculated from $K_{s0} = [Ag+][IO_3-]y_{\pm}^2$ where the activity
$\log y_{12} = -\frac{11}{2}/(1+1)$	1/2) - 0.21
also ref. (1)). Values of $K_2 = [Ag(C_3H_6NO_2)][C_3H_6NO_2^-]/[Ag(C_3H_6)]$ data, and the final value for $K_2$ was given as 2.5 x 1	NO <sub>2</sub> ) <sub>2</sub> -] were determined from the experimental solubility )-4 mol dm- <sup>3</sup> .
AUXILIARY	INFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The saturating column method was used where the basic alanine solution was passed through a column containing $AgIO_3$ . The iodate estimations were made by addition of excess solid KI to about 25 cm <sup>3</sup> of th saturated solution followed by a large addition of aci The solution was then titrated with standard thiosulf solution to a starch endpoint.	AgIO <sub>3</sub> crystals were formed by the slow addition of dilute solutions of KIO <sub>3</sub> and AgNO <sub>3</sub> to a large volume of hot water. The product was washed, dissolved in a minimun quantity of dilute $NH_4OH$ , and evaporated to dryness on a water bath. The granular crystals were washed with dil HNO <sub>3</sub> and water. Laboratory reagent grade alanine was recystallized from aqueous alcohol, and dried in a vacuum oven at 90°C for several hours.
	ESTIMATED ERROR: Soly: nothing specified. Temp: precision ± 0.02 K.
	REFERENCES: 1. Monk, C.B. Trans. Faraday Soc. <u>1951</u> , 47, 285.

Silver lodate

COMPONE	NTS:			ORIGIN	AL MEASUREM	ENTS:
(1) Silver id	odate; AgIO <sub>3</sub> ; [7783-97	-3]		Ramett	e, R.W.	
			• • •			
(2) Perchloric acid; HClO <sub>4</sub> ; [7601-90-3]		J. Chei	n. Eng. Data <u>1972</u>	<u>2</u> , 17, 195-6.		
(3) Deuteru	ım oxide (water-d <sub>2</sub> ); D	0 <sub>2</sub> O; [7789-20-/	0]			
VARIABLE	ES:			PREPAI	RED BY:	2007),,,, i izranjego, zavez i
T/K = 278	to 323			G. Janc	so, E.M. Woolley	and M. Salomon
EVDEDIMI		4-117 george				
All solubili	ties (S) determined in :	solutions conta	ining 1	x 10-4 mc	ol dm <sup>-3</sup> HClO <sub>4</sub> .	
	• •		solubil	ity	•	
		t/ºC	10 <sup>3</sup> mol	dm-3	-log K <sub>a0</sub> a	•
		•				
		5	0.608		8.45	
		15	0.953		8.05	
		25	1.411		7.72	
		35	2.06		7.39	
		50.3	3.45		6.95	
were fitted	by least squares to the $log K_{n0} = 8.8$	255 - 0.01097(	oothing e D(T/K) -	equation. 3955.2/(	T/K)	
Record on th	is smoothing aquation	the following	*****	lunomia	nuantition word on	laulatad
based on th	is smoothing equation,	, the following	g thermod	iynamic (	quantities were ca	iculated.
	ΔG	ΔH			ΔS	$\Delta C_{p}$
t/ºC	kcal mol <sup>-1</sup>	kcal mol	1-1		cal mol <sup>-1</sup> K <sup>-1</sup>	cal mol <sup>-1</sup> K <sup>-1</sup>
0	10.812	14.365			12.96	-27
25	10.520	13.635			10.45	-30
50	10.290	12.856			7945	-32
AUXILIARY I			IARY IN	FORMA	ΓΙΟΝ	
METHOD/	APPARATUS/PROCE	DURE:		SOURC	E AND PURITY C	OF MATERIALS:
A column 3	1 cm high in a 4-mm i	.d. tube was p	repared	Crystalli	ne AgIO <sub>3</sub> prepare	d by pptn from the following
from 4 g A	gIO3 crystals labeled w	vith Ag <sup>110</sup> . Th	nis	solutions	: AgNO <sub>3</sub> labeled v	with Ag <sup>110</sup> , NH <sub>4</sub> OH, KIO <sub>3</sub> ,
column was	jacketed with a larger	r tube carrying	g circu-	and 2-h	ydroxyethylacetate	e. This mixture was allowed
lating water	r from a constant temp	erature bath.	A	to stand	for 2 weeks, the	AgIO <sub>3</sub> redissolved in aq NH <sub>3</sub> ,
solution of	0.0001 mol dm-3 HClC	$D_4$ in $D_2O$ was	forced	and pptc	l with addn of HC	ClO <sub>4</sub> . All chemicals were
through the	column, and a test tu	be was used to	collect	A.R. gra	de, and $D_2O$ of p	urity greater than 99.5 % was
about 1 gra	m of saturated solutior	n which was th	nen	used as a	received from the	Liquid Carbonic Divsion of
weighed an	d counted. Backgroun	d was about 20	00 cpm,	General	Dynamics Corport	ation.
and samples	s for analyses were cou	inted to give 1	0 <sup>5</sup> to			
10 <sup>6</sup> total co	unts. The analyses we	re carried out	ona			
weight basis	s, and conversion to vo	olume units ma	ade by			**************************************
use of liter	ature densities (1) for	oure D <sub>2</sub> O.	•	ESTIMA	TED ERROR:	
Thermomet	ers checked against NF	BS calibrated t	her-	Solv: not	hing specified	
mometere	All volumetric alacewa	ire was calibra	ted.	Temp: a	curacy probably	± 0.1 K (compilers)
Standards fo	or gamma counting we	re taken by w	eight			- ou is (complicity)
from stock	solutions prend by wei	ighing dried sa	mples	·		·
of the radio	active ant followed by	v dissolving in	NaCN	REFERS	NCES:	
colution C	ounting times (10-100	min) were acc	urate	LAND MILL		
$t_0 + 0 + a_0$	onde Authors store +h	at repeated to	lubility	1 Chana	T'Chien I I	Am Cham Soc 1041 62
determinent	onus. Authors state th			1. Chang	,, r., Chiell, J. J.	. Am. Chem. 50c. <u>1941</u> , 03,
ueterminatio	ons at each temperatur	e gave assuran		1709.		
reproducibil	iity, but numerical info	ormation not g	siven.			

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COMPONENTS:	· · · · · · · · · · · · · · · · · · ·		ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]			Miyamoto, H.; Watanabe, Y.		
· · · · · ·					
(2) 2-Methoxyethanol; $C_3$	H <sub>8</sub> O <sub>2</sub> ; [109-86-4]		Nippon Kagaku Zasshi <u>1970,</u> 91, 499-500.		
	-				
(3) Water; H <sub>2</sub> O; [7732-18-	5]				
VARIABLES:			PREPARED BY:		
T/K = 298.15 and 308.15			H. Miyamoto		
·					
EXPERIMENTAL DATA:					
	2-methoxyetha	nol content	solubility		
t/⁰C	mass %	mole %	b 103mol dm-3		
25	0	٥	0.102		
23	5.000	0. 1.254	0.148		
	0.088	2 560	0.122		
	2.200	5.910	0.125		
	20.097	J.819	0.085		
	30.150	9.271	0.060		
	49,739	18.982	0.024		
	69.705	35.263	0.008		
	89.707	67.356	0.001		
	100.	100.	0		
25	0	٥	0.266		
35	0. 5 374	0.	0.200		
	5.374	1.327	0.214		
	12.279	3.208	0.166		
	20.122	5.628	0.125		
	30.056	9.234	0.084		
	49.596	18.894	0.035		
1	69.741	35.302	0.010		
	89.901	67.820	100.0		
	100.	100.	0		
	<sup>a</sup> Calculated by the	compiler.			
<u></u>	A 111	VII LADV IN			
	A02				
METHOD/APPARATUS/	PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
			)		
Excess AgIO <sub>3</sub> and solvent	mixtures were pla	ced in	AgIO <sub>3</sub> prepared by addition of dilute solutions of		
glass-stoppered bottles an	d rotated in a ther	mostat at	AgNO <sub>3</sub> and KIO <sub>3</sub> to a large volume of a dilute $KNO_3$		
the desired temperature f	or 48 hours. After	the excess	solution. This solution was then heated to boiling.		
solid had settled, aliquots	of the saturated so	lutions	The precipitate was washed and dried under reduced		
were withdrawn and were	e analyzed for iodat	te by	pressure.		
iodometric titration					
			2-Methoxyethanol was distilled twice.		
			All Chemicals were from Wako Co., and were		
1			guaranteed reagents.		
			ESTIMATED ERROR:		
{			Solv: nothing specified		
			Temp: precision $\pm 0.02$ K.		
			REFERENCES:		
			Letter the second se		

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COMPONENTS:			ORIGINAL M	IEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Dash, U.N.; Das, B.B.; Biswal, U.K.; Panda, T.			
(2) 1,2,3-Propanetriol (gl	lycerol); C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ;				
[123-91-1]		1	Thermochim.	Acta 1985, 89, 28	1-94.
(3) Water; H <sub>2</sub> O; [7732-18	5-5]				
VARIABLES:			PREPARED E	Y:	
Solvent composition					
T/K = 278  to  308			H. Miyamoto	and U.N. Dash	
EXPERIMENTAL DATA	: No solubility data me	asured.	K <sub>s0</sub> /mol <sup>2</sup> dm <sup>-</sup>	<sup>6</sup> values calculated	from cells with liquid
junctions. These solubil	ity products then used to	o calcula	ite K <sub>s0</sub> /mol <sup>2</sup> kg	g <sup>-2</sup> using literature	density values (these
data are given in the orig	ginal paper).				
glycerol content	glycerol content	10 <sup>8</sup> )	К <sub>э0</sub> (298 К)	eq. [1] const	eq. [1] const
mass %	mol %	m	ol <sub>2</sub> dm <sup>-6</sup>	-A	10 <sup>3</sup> B
0	0		1.096		
5	1.0	:	2.958	3190.0023	3174.6885
10	2.1	:	2.969	3018.0472	2599.209
20	4.7	:	3.148	3091.5334	2867.3791
30	7.7	:	2,958	3064.0415	2751.1164
The thermodynamic solu	bility products were fitte	ed to eq	. [1], and value	es of the constants.	A and B are given in
the above table (standard	l deviation for all smootl	hing eqs	= 0.1).		
	<i>log</i> K <sub>s0</sub> = A/(T	7/K) + I	3 [1]	]	
	AUXILI	ARY IN	FORMATION		
METHOD/APPARATUS	/PROCEDURE:		SOURCE ANI	D PURITY OF MA	TERIALS:
Solubility products calcul	lated from standard note	ntials	Giverol (BDI	I. AnalaR) distilled	in vac. For other
of the following type celle:		details see the AgiO <sub>2</sub> -dioxane-water compilation			
Ag,AgCl   KCl(c)	KIO <sub>3</sub> (c)   [2]				
See the compilation for t	he AgIO <sub>3</sub> -dioxane-wate	r sys-			1
tem for complete details.	- *	·			

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Dash, U.N.; Das, B.B.; Biswal, U.K.; Panda, T.
(2) Urea; CH <sub>4</sub> N <sub>2</sub> O; [57-13-6]	
(3) Water; H <sub>2</sub> O; [7732-18-5]	Thermochim. Acta <u>1985</u> , 91, 329-36.
VARIABLES:	PREPARED BY:
Solvent composition T/K = 278 to 308	H. Miyamoto and U.N. Dash

**EXPERIMENTAL DATA:** No solubility data measured.  $K_{s0}/mol^2 dm^{-6}$  values calculated from cells with liquid junctions. These solubility products then used to calculate  $K_{s0}/mol^2 kg^{-2}$  using literature density values (these data are given in the original paper).

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urea content	urea content	10 <sup>8</sup> K <sub>#0</sub> (298 K)	eq. [1] const	eq. [1] const
mass %	moi %	mol <sub>2</sub> dm °	A	10°B
0	0	1.096		
11.52	3.759	10.73	-1668.9855	-1367.884
20.31	7.102	10.95	-1541.5161	-1777.5977
29.64	11.22	17.25	-1850.6464	-563.74
36.83	14.89	17.52	-1592.2064	-1410.288
البالمم مأسيسية مستمام م	tites mandulate ware fits	wiev here [1] has of her	as of the constants	A and R are given i

The thermodynamic solubility products were fitted to eq. [1], and values of the constants A and B are given in the above table (standard deviation for all smoothing eqs = 0.05).  $log K_{s0} = A/(T/K) + B$  [1]

ν <u>δ</u>	1280	-	**/	•••	/	•	-		. L.
		-		_					
	Δ	11	хп	.T A	R)	Ζ.	NEO	RMATI	ON

AUXILIART INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
as described in the compilation for the AgIO <sub>3</sub> -dioxane-	details, see the AgIO <sub>3</sub> -dioxane-water compilation.				
water system.					

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220	Sliver lodate
COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3] (2) 1,4-Dioxane; C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> ; [123-91-1] (3) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Dash, U.N., Das, B.B.; Biswal, U.K., Panda, T.; Purohit, N.K.; Rath, D.K.; Bhattachary, S. Thermochim. Acta <u>1983</u> , 71, 199-207.
VARIABLES: Solvent composition T/K = 278 to 298	PREPARED BY: H. Miyamoto and U.N. Dash
<b>EXPERIMENTAL DATA:</b> No solubility da junctions. These solubility products then u	ta measured. $K_{s0}/mol^2 dm^{-6}$ values calculated from cells with liquid sed to calculate $K_{s0}/mol^2 kg^{-2}$ using literature density values.

	dioxane composition	dioxane composition	10 <sup>9</sup> K <sub>s0</sub>	109K0	
t/ºC	mass %	mol %	mol <sup>2</sup> dm <sup>-6</sup>	mol <sup>2</sup> kg <sup>-2</sup>	
5	10	2.2	3.420	3.280	
	20	4.9	2.951	2.803	
	30	8.1	1.570	1.455	
	40	12.0	0.789	0.728	
10	10	2.2	6.100	5.930	
	20	4.9	4.052	3.858	
	30	8.1	2.035	1.905	
	40	12.0	1.091	1.006	
15	10	2.2	10.530	10.248	
	20	4.9	5.551	5.310	
	30	8.1	2.561	2.422	
	40	12.0	1.411	1.318	
20	10	2.2	17.350	17.080	
	20	4.9	7.408	7.148	
	30	8.1	3.192	3.040	
	40	12.0	1.839	1.733	
25	10	2.2	27.050	26.740	
	20	4.9	9.754	9.493	
	30	8.1	3.491	3.345	
	40	12.0	2.338	2.206	

#### AUXILIARY INFORMATION

#### METHOD/APPARATUS/PROCEDURE:

Solubility products calculated from standard potentials of cells employing water-dioxane mixed solvents. The following cells with liquid junctions were used.

> $Ag,AgCl | KCl(c) | KIO_3(c) |$ [1]

Emf values of cell [1] obtained from ref. (1). The solubility product of AgIO<sub>3</sub> was caculated from

 $ln K_{s0} = \{E^0(1) - E^0(2)\}F/RT$ [3]

After correcting emf values for cells [1] and [2] for liquid junction potentials using the Henderson equation, E<sup>0</sup> values obtained by extrapolation to infinite dilution using the extended Debye-Hückel equation.  $E_{li}$  varied from 0.1 to 0.3 mV for all cases.

SOURCE AND PURITY OF MATERIALS: A.R. grade chemicals were dried and not treated any further. Dioxane (G.R. Merck) purified by treatment with beads of NaOH followed by refluxing for 48 hours and distillation. This product was then refluxed over metallic Na for 6 hours. The Na-treated solvent was redistilled just prior to use.

#### **ESTIMATED ERROR:**

Emf measurements reproducible to around  $\pm 0.2$  mV. Temp: precision ± 0.1 K.

### **REFERENCES:**

1. Dash, U.N.; Padhi, M.C.; Thermochim. Acta 1982, 56, 113.

Silver lodate		
COMPONENTS:	ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Miyamoto, H.	
(2) Tetrahydrofuran; C <sub>4</sub> H <sub>8</sub> O; [109-99-9]	Nippon Kagaku Kaishi <u>1972,</u> 659-61	
(3) Water; H <sub>2</sub> O; [7732-18-5]		
VADIADIEC.	DEDADEN DV.	
Solvent composition		
T/K = 298.15	H. Miyamoto	
EXPERIMENTAL DATA:		
	· ·	
ether content of solvent	solubility	
mass % mol %ª	10 <sup>3</sup> mol dm <sup>-3</sup>	
	0.192	
5 1.3	0.146	
15 42	0.077	
20 5.9	0.051	
25 7.7	0.031	
30 9.7	0.019	
<sup>a</sup> Calculated by the compiler.		
AUXILI	ARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
Water-ether mixtures and excess $AgIO_3$ were pla glass-stoppered bottles. The bottles were sealed rotated in a thermostat regulated at 25°C. After hours the concentration of $AgIO_3$ was determine indometrically	AgIO <sub>3</sub> was prepared by mixing solutions of AgNO <sub>3</sub> and And KIO <sub>3</sub> . The product was filtered, washed, and dried under reduced pressure. d The ether tetrahydrofuran was distilled over NaOH and	
	then redistilled over metallic Na. All Chemicals used were reagent grade.	
	ESTIMATED ERBOR	
	Soly: nothing specified. Temp: precision ± 0.02 K.	
	REFERENCES:	

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222		Silver	lodate	
COMPONENTS:			ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]			Miyamoto, H.; Watanabe, Y.	
(2) Ethylene carbonate; $C_3H_4O_3$ ; [96-49-1]		]	Nippon Kagaku Zasshi <u>1967,</u> 88, 36-8.	
(3) Water; H <sub>2</sub> O; [7732-18-	-5]			
VARIABLES:			PREPARED BY:	
Solvent composition $T/K = 298.15$ and $308.15$			H. Miyamoto	
EXPERIMENTAL DATA	:			
	ethylene car	bonate content	solubility	
t/ºC	mass %	mole %	b 10 <sup>3</sup> mol dm- <sup>3</sup>	
25	0.	0.	0.192	
	5.472	1.170	0.171	
	10.110	2.239	0.154	
	19 991	4.863	0.126	
	30.013	8.065	0.085	
	20.260	11 920	0.060	
	50.100	17.039	0.000	
	50.102	17.041	0.041	
	00.208	23.037	0.021	
	79.855	44.780	0.008	
35	0.	0.	0.265	
	4 933	1.050	0.237	
	10 049	2 234	0.215	
	20.062	1 001	0.215	
	20.005	9.004	0.170	
	30.209	8.135	0.134	
	40.231	12.103	0.097	
	50.141	17.063	0.071	
	60.159	23.600	0.047	
	79.802	44.698	0.014	
	93.598	74.943	0.006	
	*Calculated by	the compiler.		
		AUXILIARY IN	FORMATION	
METHOD/APPARATUS	/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Excess Agin, and solven	t mixtures were	placed in	Agio, prepared by addition of dilute solutions of	
glass_stangered hattles ar	a rotated in a t	hermostat at	AgNO <sub>2</sub> and KIO <sub>2</sub> (Wate Co. guaranteed reasont) to a	
the desired temperature f	for 72 hours A	ft the exercise	AgnO <sub>3</sub> and KIO <sub>3</sub> (wako Co., guaranteed reagent) to a	
the desired temperature i	or $\frac{12}{12}$ nours. A	It the excess	large volume of a dilute KNO3 solution. This solution	
solid had settled, aliquots	or the saturate	u solutions	was then heated to bolling. After aging, the precipitate	
were withdrawn and wer	e analyzed for i	odate by	was washed and dried under reduced pressure.	
iodometric titration				
			Ethylene carbonate (Tokyo Kasei Co., guaranteed	
			Toagenty was distinct twice under reduced pressure.	
			ESTIMATED ERROR:	
			Soly: nothing specified.	
			Temp: precision ± 0.02 K.	
			REFERENCES:	

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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Janardhanan, S.; Kalidas, C.	
(2) Sulfinyl bis-methane (dimethyl sulfoxide); $C_2H_6OS$ ;		Bull. Chem. Soc. Jpn. <u>1980</u> , 53, 2363-5.	
[67-68-5]			
(3) Water; H <sub>2</sub> O; [7732-18-5]			
-			
VARIABLES:		PREPARED BY:	
Solvent composition		II Minemoto	
1/K = 505		H. Miyamoto	
EXPERIMENTAL DATA:		I	
dimethyl sulfoxide	content	solubility	
mol fraction	mass %ª	104 mol kg-1	
0.0	0.0	3.3	
0.1	32.5	3.0	
0.2	52.0	2.8	
0.3	65.0	2.4	
0.4	74.3	2.1	
0.5	81.3	0.73	
0.6	86.7	0.46	
0.7	91.0	0.40	
0.8	94.5	0.25	
0.9	97.5	0.18	
1.0	100.0	0.08	
<sup>a</sup> Calculated by the co	ompiler.		
	AUXILIARY II	NFORMATION	
METHOD/APPARATUS/PROCEDUR	E:	SOURCE AND PURITY OF MATERIALS	
		SOCKOD MAD FORTE OF MATERIALS.	
Excess AgIO <sub>3</sub> was placed in mixtures of	of C <sub>2</sub> H <sub>6</sub> OS-H <sub>2</sub> O	AgIO <sub>3</sub> was prepared by mixing solutions of AgNO <sub>3</sub> and	
which were vigorously stirred for 24 h	ours. These	KIO <sub>3</sub> . The product was first washed with water and	
solutions were then transferred to a the	ermostat	then with acetone and then dried in vacuum at 70 -	
maintained at $30 \pm 0.1$ °C. Stirring was	continued for	80°C for several hours. The purity of the salt was	
solution and solid were separated by c	equinorated	checked by determination of silver content.	
The silver content in the saturated solu	itions was	Dimethyl sulfoxide (BDH, AR grade) was heated to	
determined by addition of excess stand	lard aqueous KI,	90°C over NaOH for 2 hours. amd then flash-distilled	
followed by potentiometric titration with	ith standard	under vacuum.	
aqueous AgNO <sub>3</sub> solution. No oxidation	n of 1- was	Doubly distilled water and the	
observed.		Doubly distilled water was used.	
		ESTIMATED ERROR:	
		Soly: nothing specified.	
		1 emp: precision $\pm$ 0.1 K.	
		DEEDENCES.	
		KEFEKENCES:	

COMPONENTS:	<u></u>	ORIGINAL MEASUREMENTS:		
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Dash, U.N.		
<ul> <li>(2) Perchloric acid; HClO<sub>4</sub>; [7601-90-3]</li> <li>(3) Formamide; CH<sub>3</sub>NO; [75-12-7]</li> </ul>		Thermochim. Acta <u>1975</u> , 11, 25-33.		
				(4) Water; H <sub>2</sub> O; [7732-18-5]
VARIABLES		PREPARED BY:		
Concentration of HClO <sub>4</sub>				
T/K = 298.15, 303.15 and 308	3.15	H. Miyamoto		
EXPERIMENTAL DATA:				
Note that the solubility, S, of	AgIO <sub>3</sub> in HClO <sub>4</sub> /formamie	de solutions prepared from 70 % (in water) HClO <sub>4</sub> .		
	HClO <sub>4</sub> concn	104S		
t/ºC	mol dm-3	mol dm-3		
25	0.01592	2.511		
	0.01836	2.540		
	0.03200	2.656		
	0.05912	2.984		
	0.06089	3.015		
	0.09568	3.452		
20	0.01//5	2.9.40		
30	0.01005	2.849		
	0.02980	3.027		
	0.03134	3.053		
	0.09918	4.166		
	0.14240	5.028		
35	0.01029	3.273		
22	0.02629	3 475		
	0.06726	4 133		
	0.08196	4.363		
2	0.09668	4.732		
	AUXILIARY IN	IFORMATION		
METHOD/APPARATUS/PRC	CEDURE:	SOURCE AND PURITY OF MATERIALS:		
Solutions were prepared by di	ssolving weighed amounts	AgIO <sub>3</sub> prepd by mixing dil solutions of c.p. grade		
of HClO4 in known (weighed)	amounts of formamide	AgNO <sub>3</sub> and twice-recrystalized KIO <sub>3</sub> . The ppt was		
at an ice-cold temperature to	prevent decomposition of	aged for several days in the mother sin, washed, and		
formamide upon mixing. The	se mixtures were placed	dried in a vacuum oven at 60°C. HClO <sub>4</sub> of G.R.		
in amber-colored glass-stoppe	red bottles containing	quality (70 %) was used.		
excess AgIO <sub>3</sub> . The bottles we	re stoppered and heavily			
paraffined, and then rotated in	n a water thermostat at a	Commercial formamide was treated with CaO and		
specified temperature for 7 to	8 hours (see ref. (1)).	distilled at reduced pressure.		
$AglO_3$ in the satd slns detd io	dometrically using 0.01	ESTIMATED ERROR:		
mol dm <sup>-3</sup> $Na_2S_2O_3$ sin and a n	aicroburet. Each	Soly: reproducibility not given, but titrns accurate to		
solubility value is the average	of "three closely agreeing	± 0.2 %.		
results."		Temp: precision ± 0.01 K.		
		REFERENCES:		
		I Nouse Di Dook II N. Thomas I.I. Asta 1070		
		11. INAYAK, D.; Dasn, U.N. Inermochim. Acta <u>1973</u> ,		
		0, 223.		
		I		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	Subramanian, S.; Rao, S.C.A.V.S.S.; Kalidas, C.
(2) Acetonitrile; C <sub>2</sub> H <sub>3</sub> N; [75-05-8]	Indian J. Chem. A, <u>1981</u> , 20, 723-5.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Solvent composition $T/K = 303$	H. Miyamoto

# EXPERIMENTAL DATA:

acetonitrile c	solubility	
mol fraction	mass %ª	104 mol kg-1
0.0	0.0	3.24
0.1	20.2	9.84
0.2	36.3	9.34
0.3	49.4	7.26
0.4	60.3	5.26
0.5	69.5	3.27
0.6	77.4	1.89
0.7	84.2	0.981
0.8	90.1	0.578
0.9	95.4	0.541
1.0	100.0	0.619

<sup>a</sup>Calculated by the compiler.

#### AUXILIARY INFORMATION

# METHOD/APPARATUS/PROCEDURE:

Excess AgIO<sub>3</sub> was placed in mixtures of  $C_2H_3N-H_2O$ which were vigorously stirred for 24 hours. These solutions were then transferred to a thermostat maintained at 30 ± 0.1°C. Stirring was continued for another 24 hours after which time the equilibrated solution and solid were separated by centrifugation. The silver content in the saturated solutions was determined by addition of excess standard aqueous KI, followed by potentiometric titration with standard aqueous AgNO<sub>3</sub> solution.

# SOURCE AND PURITY OF MATERIALS:

AgIO<sub>3</sub> was prepared by mixing solutions of AgNO<sub>3</sub> and KIO<sub>3</sub>. The product was first washed with water and then with acetone and then dried in vacuum at 70 -  $80^{\circ}$ C for several hours. The purity of the salt was checked by determination of silver content.

Acetonitrile (BDH, LR) dried over anhydrous  $K_2CO_3$ and distilled was further purified as in (1): bp = 80°C,  $d_{25} = 0.7766$  g cm<sup>-3</sup>,  $n_d^{25} = 1.3436$ .

Doubly distilled water was used.

### **ESTIMATED ERROR:**

Soly: accuracy within ± 1%. Temp: precision ± 0.1 K.

# **REFERENCES:**

1. Jayadevappa, E.S. Indian J. Chem. <u>1969</u>, 7, 1146.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver iodate: AgIO <sub>3</sub> : [7783-97-3]	Vosburgh, W.C.: Cogswell, S.A.
(2) Pyridine; C <sub>5</sub> H <sub>5</sub> N; [110-86-1]	J. Am. Chem. Soc. <u>1943</u> , 65, 2412-3.
(3) Water; H <sub>2</sub> O; [7732-18-5]	
VARIABLES:	PREPARED BY:
Concentration of pyridine	· · · · · · · · · · · · · · · · · · ·
T/K = 298.15	H. Miyamoto
EXPERIMENTAL DATA:	
pyridine content 10	D <sup>3</sup> (solubility)
mol kg <sup>-1</sup>	mol kg <sup>-1</sup>
0.0497	1.082
0.0547	1.180
0.0571	1.232
0.0997	2.084
0.1013	2.130
0.1075	2.244
0 1493	3 089
0 1498	3 122
0 2018	4 173
0.2061	4 189
0 3026	6.27
0.5020	8 46
0.409	8.47
0.516	10.66
0.516	10.00
0.510	10.72
0.728	15.05
equilibrium constant of 7.8 x $10^{-5}$ mol <sup>2</sup> kg <sup>-2</sup> (note that $(Ag^+)(Py)^2/(AgPy_2^+)$ ).	the equilibrium constant K was defined as
AUXILIARY IN	NFORMATION
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The procedure was as follows (1). Pyridine solutions were saturated with AgIO <sub>3</sub> in Pyrex flasks immersed in a water bath at 25.00°C, and avoiding diffused daylight or artificial light. Samples for analyses were taken after 3-4 h, and again two or more h later to for constancy in concentrations. The aliquots were re- moved with a pipet to which was attached a filter either of Pyrex glass wool or Pyrex fritted glass.	AgIO <sub>3</sub> prepared by mixing solutions of AgNO <sub>3</sub> and KIO <sub>3</sub> in the dark with continuous stirring. After digestion for 24 h, the precipitate was washed and dried at 110°C. Practical grade pyridine was refluxed over BaO and distilled through a Widmer column. A fraction within a boiling range of 0.2 K was taken.
Aliquots were weighed and the jodate content deter-	ESTIMATED ERROR:
mined indometrically with 0.01 mol dm-8 this sulfate	Solv nothing specified
solution. Ammonium molybdate was used as a catalyst	
	Temp: precision $\pm$ 0.05 K.
	DEEEDENCES.
	I. Derr, P.F.; Stockdale, R.M.; Vosburgh, W.C. J. Am Chem. Soc. <u>1941</u> , 63, 2670.

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]	ORIGINAL MEASUREMENTS: Palanivel, A.; Rajendran, G.; Kalidas, C.
(2) Pyridine; C <sub>5</sub> H <sub>5</sub> N; [110-86-1] (3) Water; H <sub>2</sub> O; [7732-18-5]	Ber. Bunsen. Ges. Phys. Chem. <u>1986</u> , 90, 794-7.
VARIABLES: Solvent composition T/K = 303.15	PREPARED BY: H. Miyamoto and M. Salomon

# EXPERIMENTAL DATA:

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pyridine content		solubility	K <sub>s0</sub> b
mol fraction	mass %ª	10 <sup>3</sup> mol kg <sup>-1</sup>	mol <sup>2</sup> kg <sup>-2</sup>
0.0	0.0	0.322	9.91 x 10 <sup>-8</sup>
0.1	32.8	56.94	1.99 x 10-3
0.2	52.3	45.76	1.13 x 10 <sup>-3</sup>
0.3	65.3	26.39	3.49 x 10-4
0.4	79.5	15.72	1.17 x 10-4
0.5	81.4	8.80	3.70 x 10 <sup>-5</sup>
0.6	86.8	4.80	1.01 x 10 <sup>-5</sup>
0.7	91.1	2.50	2.70 x 10 <sup>-6</sup>
0.8	94.6	1.09	5.45 x 10 <sup>-7</sup>
0.9	97.5	0.565	1.64 x 10-7
1.0	100.0	0.259	3.88 x 10 <sup>-8</sup>

<sup>a</sup>Calculated by the compilers.

<sup>b</sup>These are thermodynamic solubility product constants.

AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
Experimental method given in reference (1). Solvent compositions are accurate to within $\pm$ 0.02 %. All solubility measurements were carried out at least twic and the agreement was better than $\pm$ 0.2 %.	AgIO <sub>3</sub> prepared as in (2). Purity of all salts checked by potentiometric determination of silver content. e, Pyridine was refluxed over KOH for 8 h followed by fractional distillation. The middle fraction, b.p.=			
Thermodynamic solubility product constants calculate using the extended Debye-Hückel equation with an ic size parameter $a = 0.65$ nm. Dielectric constants, $\epsilon$ , were detd with a DK meter 60 GK (Franz Kustner	<ul> <li>d 115°C at 760 mm Hg, was collected and stored over fresh KOH. At 25°C, this product had a density of 0.9787 g cm<sup>-3</sup> and a viscosity of 0.885 cP.</li> </ul>			
Nachf. KG, Dresden) and are accurate to within ± 0.2 %.	2 Doubly distilled conductivity water was used in the preparation of solvent mixtures.			
mole % pyridine         ε           0.0         76.7           0.1         62.7           0.2         50.1           0.3         40.0	ESTIMATED ERROR: Soly: precision better than ± 0.2 %. Temp: precision ± 0.05 K.			
0.4     33.0       0.5     28.5       0.6     22.2       0.7     18.2       0.8     15.0	REFERENCES: 1. Kalidas, C.; Schneider, H. Z. Phys. Chem. N.F. <u>1981</u> , 10, 487. 2. Janardhanan, S.; Kalidas, C. Bull, Chem. Soc. Jan			
0.9 13.7 1.0 12.3	<u>1980, 53, 2363.</u>			

Si	lver	100	late
~	1.4.01	100	ເພເບ

COMPONENTS: (1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		ORIGINAL MEASUREMENTS: Kolthoff, I.M.: Chantooni, M.K.	
(2) Tetraethylammonium iodate: C <sub>8</sub> H <sub>20</sub> NIO <sub>3</sub> ;		J. Phys. Chem. 1973, 77, 523-6.	
[6] 327-93-3]		······································	
(3) Methanol; $CH_4O$ ; [67-56-1]			
VARIABLES:		PREPARED BY:	
Concentration of $(C_2H_5)_4NIO_3$		H Miyamoto FM Woolley and M Salomon	
1/K - 250			
EXPERIMENTAL DATA:			
(1) Results based on potentiometric m	ieasurements.		
concn of			
(C2H5)4NIO3	E <sub>1</sub> -lo;	$g K_{s0} = 10^{13} K_{s0}^{a}$	
mol dm- <sup>3</sup>	mV	mol <sup>2</sup> dm <sup>-6</sup>	
0.00216	-444 12	$2.5_0$ $3.1_6$	
0.0210	-507 12	2.05 2.24	
a	verages: 12	2.6 2.7	
<sup>a</sup> Calculated by compiler.			
(2) From the equilibrium given in rea	ction 2 below, th	e solubility product of AgIO <sub>3</sub> was calculated from:	
	K (AqIO)	(105)	
	$\frac{R_{*0}(Agrog}{K_{*}(Agrog})$	$\frac{1}{2} = \frac{1}{2}$	
	R <sub>s0</sub> (Nger		
Taking log $K_{s0}(AgCl) = -13.2$ in metha above equation. This gives $K_{s0}(AgIO_3)$	(100) (2), an average = 2.0 x 10 <sup>-13</sup> mc	ge value of $\log K_{s0}(AgIO_3) = -12.7$ is obtained from the $ol^2 dm^{-6}$ (compilers).	
AUXILIARY INFORMATION		FORMATION	
METHOD/APPARATUS/PROCEDURI		SOURCE AND PURITY OF MATERIALS:	
The solubility product of AgIO <sub>3</sub> in wat	er was	AgIO <sub>3</sub> prepared in the "conventional way." Tetraethy-	
determined potentiometrically by measu	uring emf values	lammonium iodate prepd by neutralization of aq	
of the following cell:		$(C_2H_5)_4$ NOH with Merck reagent grade HIO <sub>3</sub> . The	
		resulting solution was evaporated to dryness, and the	
$Ag,AgIO_3   salt(c_1)    AgNO_3(c_2)   A$	Ag [1]	solid recrystallized from ethyl acetate. The purity of	
In the above con "salt" = tetraethviamn	nonium iodate at	the product was 99.5 % (deta todometrically).	
concentration $c_1$ , $c_2 = 0.01$ mol dm <sup>-3</sup> , a	nd    is a salt	Salts were dried in vacuum at 70°C for 3 hours.	
bridge containing 0.01 mol dm <sup>-3</sup> tetrae	thylammonium	Electrodes were prepared electrolytically (1), and	
picrate.		methanol (Matheson, "Spectroquality") was distilled	
		once from Mg turnings: water content was less than	
In a second method to determine $K_{s0}$ , t	the authors		
studied the exchange equilibrium	1	0.01 %.	
		0.01 %.	
		0.01 %. 	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgIO_3(s) \oplus (C_2H_5)_4NCl(sln) + AgIO_3(s) $	NIO <sub>3</sub> (sln)	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV.	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgCl$	VIO <sub>3</sub> (sln) (s) [2]	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given.	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgCl$	VIO <sub>3</sub> (sln) (s) [2] with solutions	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. PEFERENCES:	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgCl$ Two measurements were made starting of initial $(C_2H_5)_4NCl$ concentrations of	VIO <sub>3</sub> (sln) (s) [2] with solutions 0.00785 and	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. REFERENCES: 1. Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc.	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl$ Two measurements were made starting of initial $(C_2H_5)_4NCl$ concentrations of 0.0144 mol dm <sup>-3</sup> . After equilibration v	VIO <sub>3</sub> (sln) (s) [2] with solutions 0.00785 and vith solid AgIO <sub>3</sub> .	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. REFERENCES: 1. Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc. 1965, 87, 4428: Ives, D.J.; Janz, G.J. Reference	
(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> NCl(sln) + AgIO <sub>3</sub> (s) ⇔ (C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> N + AgCl Two measurements were made starting of initial (C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> NCl concentrations of 0.0144 mol dm <sup>-3</sup> . After equilibration w the iodate concentrations in the above	NIO <sub>3</sub> (sln) (s) [2] with solutions 0.00785 and vith solid AgIO <sub>3</sub> , two chloride	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. REFERENCES: 1. Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc. 1965, 87, 4428: Ives, D.J.; Janz, G.J. Reference Electrodes. Academic Press, NY. 1961, page 207.	
$(C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgIO_3(s) \Leftrightarrow (C_2H_5)_4NCl(sln) + AgCl$ Two measurements were made starting of initial $(C_2H_5)_4NCl$ concentrations of 0.0144 mol dm <sup>-3</sup> . After equilibration w the iodate concentrations in the above to solutions were determined iodometrical	NIO <sub>3</sub> (sln) (s) [2] with solutions 0.00785 and vith solid AgIO <sub>3</sub> , two chloride ly and found to	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. REFERENCES: 1. Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc. <u>1965</u> , 87, 4428: Ives, D.J.; Janz, G.J. Reference Electrodes. Academic Press, NY. <u>1961</u> , page 207.	
(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> NCl(sln) + AgIO <sub>3</sub> (s) ⇔ (C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> N + AgCl Two measurements were made starting of initial (C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> NCl concentrations of 0.0144 mol dm <sup>-3</sup> . After equilibration w the iodate concentrations in the above to solutions were determined iodometrical be 0.002 and 0.00384 mol dm <sup>-3</sup> , respect	NIO <sub>3</sub> (sln) (s) [2] with solutions 0.00785 and with solid AgIO <sub>3</sub> , two chloride ly and found to tively.	0.01 %. ESTIMATED ERROR: Emf values: precision within ± 2 mV. Temp: not given. REFERENCES: 1. Kolthoff, I.M.; Chantooni, M.K. J. Am. Chem. Soc. <u>1965</u> , 87, 4428: Ives, D.J.; Janz, G.J. Reference Electrodes. Academic Press, NY. <u>1961</u> , page 207. 2. Buckley, P.; Hartley, H. Phil. Mag. <u>1929</u> , 8, 320.	

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COMPONENTS:		ORIGINAL MEAS	SUREMENTS:
(1) Silver iodate: AgIO <sub>6</sub> : [7783-97-3]		Japardhanan S: Kalidas C	
(1) Shiver Iouale, Agio <sub>3</sub> , [1/85-97-5]		Janarananan, D., 1	Kandas, C.
(2) Dimethyl sulfoxide (sulfinyl bis-methane); $C_2H_6OS$ ;		Proc. Indian Acad	d. Sci. Sec. A <u>1981,</u> 90, 89-92.
(3) Methanol; $CH_4O$ ; [67-56-1]			
VARIABLES:	]	PREPARED BY:	#)#+++++++++++++++++++++++++++++++++++
Solvent composition $T/K = 202.15$		TT Minamata	
1/K = 505.15		H. Miyamoto	
EXPERIMENTAL DATA:			
dimethyl sulfoxide content		solubility	10 <sup>10</sup> K <sub>s0</sub> <sup>a</sup>
mol fraction mass % <sup>b</sup>		10 <sup>5</sup> mol kg <sup>-1</sup>	mol <sup>2</sup> kg <sup>-2</sup>
		0.400	
0 0		0.438	0.192
0.1 21		0.256	0.0655
0.2 38		0.465	0.216
0.3 51		0.530	0.281
0.4 62		0.960	0.922
0.5 71		1.03	1.06
0.6 79		1.08	1.17
0.7 85		2.15	4.62
		2.15	4.02
0.0 91		2.47	0.10
0.9 96		2.66	7.08
Compilers assume this is a contractivity coefficients were employed by the compiler	solubility product	t since authors do not indicate that	
-Calculated by the complicit.			
AUXILIARY IN		FORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PL	JRITY OF MATERIALS:
A potentiometric method was employed using the fol- lowing concentration cell:		AgIO <sub>3</sub> prepd by m and KIO <sub>3</sub> . The pr water and then wit	ixing solutions of AR grade AgNO <sub>3</sub> roduct was repeatedly washed with th acetone, and then dried in vacuum
$Ag \mid AgIO_{3}(c_{1}) \parallel AgNO_{3}(c_{2}) \mid Ag$	z	at 70-80°C for sev	veral hours.
where $c_1$ is the satd sln, $c_2 = 0.005$ mol dm <sup>-3</sup> , as	and    is k	C <sub>2</sub> H <sub>6</sub> OS (BDH, LR	R) was heated to 90°C over NaOH for
a salt bridge containing 0.1 mol dm <sup>-3</sup> tetraethyla	lammo- 2	2 h, and then flash	n-distilled under vacuum. The
nium picrate in the same solvent. The emf of t	this cell	product was dried over molecular sieves. Methanol	
is related to the activities of silver ion in the sa	uturated (	BDH. LR) was re	fluxed over neutral alumina and
solution and the reference solution by		distilled, dried ove distilled.	er $Na_2SO_4$ , and finally fractionally
$E = RT/F \ln\{(a_{Ag}+)_2/(a_{Ag}+)_1\}$	E	ESTIMATED ERR	OR:
K a = [Ag+][[0] was probably calculated by as	ssumino I	Kan: nothing specif	fied
$[Ag^+] = [IO_3^-]$ , and by neglecting ionic activity client effects.	coeffi-	Temp: precision ±	0.02 K.
	ļ	REFERENCES:	<u> </u>

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Kalidas, C.; Schneider, H.	
(2) N-Methylformamide; C <sub>2</sub> H <sub>5</sub> NO; [123-39-7]		Electrochim. Acta <u>1982</u> , 27, 477-9:	
		Proc. Intern. Symp. Ind. Oriented Basic Electrochem.	
		2nd. Madras, India, <u>1980</u> . Tech. Session V. No.	
(3) Methanol; CH <sub>4</sub> O; [67-56-1] VARIABLES:		5.10.1-6.	
		PREPARED BY:	
Solvent composition			
1/K. = 298.15		H. Miyamoto and E.M. wooney	
EXPERIMENTAL DATA:			
N-methylforman	nide content	10 <sup>12</sup> K <sub>s0</sub> s	
mol fraction	mass %b	mol <sup>2</sup> dm <sup>-6</sup>	
0.00	0.	0.116	
0.10	17.	0.185	
0.20	32.	1.69	
0.30	44.	3.69	
0.40	55.	14.1	
0.50	65.	22.6	
0.60	73.	41.7	
0.70	81.	78.7	
0.80	88.	87.8	
0.90	94.	125.	
1.00	100.	247.	
	AUXILIARY II	NFORMATION	
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Satd slns of silver iodate in the various solvent		AgIO <sub>3</sub> prepd by mixing stoichiometric slns of AR grad	
mixtures prepd by stirring about 2:	5 cm <sup>3</sup> of solvent	$ AgNO_3 $ and KIO <sub>3</sub> . The product was repeatedly washed	
with excess salt in a thermostat for	12 nours. A	with dista water and then with alcohol and then dried	
ing cell.	eu using me tonow-	In vacuum at 70°C for 12 hours.	
		$C_{2}H_{5}NO$ was shaken with $P_{2}O_{5}$ , filtered through glass	
$Ag   AgIO_3(c_1)    AgNO_3(c_2)   Ag$		wool and vacuum distilled. This was repeated three times followed by two more vacuum distillations	
		without $P_2O_5$ . The electrolytic conductance of the	
where $c_1$ is the satd $sln$ , $c_2 = 0.005$	mol dm-3, and    is	product at 25°C was 1 x 10 <sup>-5</sup> S cm <sup>-1</sup> .	
a salt bridge containing 0.1 mol dn	n-3 tetraethylammo-		
nium picrate in the same solvent. is given by	The emf of this cell		
		ESTIMATED ERROR:	
$E = RT/F \ln\{(a_{Ag}+)_2/(a_{Ag})\}$	+)1}	K <sub>s0</sub> : nothing specified.	
		Temp: precision ± 0.02 K.	
The silver electrodes were prend el	ectrolytically and	REFERENCES:	
were reproducible to $\pm 1 \text{ mV}$ . K <sub>a0</sub>	= [Ag+][IO <sub>3</sub> -]		
probably calcd assuming [Ag+] = [I	O <sub>3</sub> -] and by		
neglecting activity coefficient effect	ets.		
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Silver lodate

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COMPONENTS:		ORIGIN	ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Subrama	nian, S.; Kalidas, C.	
(2) Methanol; CH <sub>4</sub> O; [67-	56-1]	Fluid Ph	ase Equilib. <u>1987,</u> 32, 205-10.	
(3) Acetonitrile; C <sub>2</sub> H <sub>3</sub> N; [	75-05-8]			
VARIABLES:		PREPAR	ED BY:	
Solvent composition $T/K = 303$		H Miya	moto	
1/IC = 303		11. Wilya	linoto	
EXPERIMENTAL DATA:		·····		
acetonitrile conc	entration	solubility	10 <sup>9</sup> K.0	
mole fraction	mass %	mol kg <sup>-1</sup>	mol <sup>2</sup> kg <sup>-2</sup>	
0.0	0.0	0.442	0.0192	
0.1	12.5	4.054	1.556	
0.2	24.3	10.696	10.500	
0.3	35.4	13.127	15.720	
0.4	46.1	10.404	9.976	
0.5	56.2	9.300	8.021	
0.6	65.8	7.674	5.495	
0.7	74.9	6.087	3.486	
0.8	83.7	5.029	2.394	
0.9	92.0	3.417	1.117	
1.0	100.0	2.078	0.417	

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AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
Potentiometric method as in (1). All measurements carried out at 30°C using the cell: $Ag/AgIO_3(m_1) \parallel AgNO_3(m_2)/Ag$ where $m_1$ is the molality of the satd sln, $m_2 = 0.005$ mol kg <sup>-1</sup> , and $\parallel$ is a salt bridge containing 0.1 mol kg <sup>-1</sup> tetraethylammonium picrate (Et <sub>4</sub> NPic) in the same solvent. The silver ion activity in the saturated solution is obtained from the e.m.f. data using the following equation: $E = (RT/F) ln \{(a_{Ag}+)_{ref}/(a_{Ag}+)_{satd sln}\}$	AgIO <sub>3</sub> prepd by double decomposition using aqueous AgNO <sub>3</sub> and KIO <sub>3</sub> slns. Purity of the salt confirmed by potentiometric titrn of silver. Acetonitrile (LR BDH) was distilled, dried over anhydr $K_2CO_3$ , and distilled again in the presence of AgNO <sub>3</sub> crystals: b.p. 80 ± 0.1°C, and d <sup>25</sup> = 0.7766 g cm <sup>-3</sup> . Methanol (LR BDH) was distilled, dried over anhydr Na <sub>2</sub> SO <sub>4</sub> , and then distilled from Mg turnings. The middle fraction boiling at 64-65° was collected: d <sup>25</sup> = 0.7867 g cm <sup>-3</sup> (ref. (2)).		
REFERENCES:	ESTIMATED ERROR:		
<ol> <li>(1) Kalidas, C.; Schneider, H. Electrochim. Acta <u>1982</u>, 27, 477.</li> <li>(2) Subramanian, S.; Kalidas, C. Electrochim. Acta <u>1984</u>, 29, 753.</li> </ol>	Soly: the average deviation does not exceed $\pm$ 0.5 %. Temp: precision $\pm$ 0.1 K.		

232	Silver Iodate		
COMPONENTS:			ORIGINAL MEASUREMENTS:
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]			Subramanian, S.; Kalidas, C.
(2) Ethanol; C <sub>2</sub> H <sub>6</sub> O; [64-17-5]			Fluid Phase Equilib. <u>1987,</u> 32, 205-10.
(3) Acetonitrile; C <sub>2</sub> H <sub>3</sub> N	v; [75-05-8]		
VARIABLES			PRFPARFN RV
Solvent composition			
T/K = 303			H. Miyamoto
EXPERIMENTAL DAT	ΓA:		
acetonitrile co	oncentration	solubi	ility 10 <sup>10</sup> K <sub>s0</sub>
mole fraction	mass %	mol k	g <sup>-1</sup> mol <sup>2</sup> kg <sup>-2</sup>
0.0	0.0	0.107	0.0242
0.0	0.0	0.187	0.0343
0.1	9.0	0.741	0.551
0.2	18.2	1.180	) 1.301 2.35 <b>2</b>
0.3	27.6	1.8/4	3.352
0.4	37.3	2.483	5.861
0.5	47.1	2.958	8,301
0.6	57.2	3.396	10.948
0.7	67.5	3.175	9.603
0.8	78.1	2.764	7.322
0.9	88.9	2.301	5.106
1.0	100.0	2.078	4.173
	AUX	KILIARY IN	FORMATION
METHOD/APPARATL	JS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:
Potentiometric method carried out at 30°C usi	as in (1). All measure ng the cell:	ements	AgIO <sub>3</sub> prepd by double decomposition using aqueous $AgNO_3$ and $KIO_3$ sins. Purity of the salt confirmed by potentiometric titrn of silver.
Ag/AgIO <sub>3</sub> (m <sub>1</sub> ) Ag	3NO3(m2)/Ag		
			Acetonitrile (LR BDH) was distilled, dried over anhydr
where m <sub>1</sub> is the motali	ty of the satd sin, $m_2$	= 0.005	$K_2CO_3$ , and distilled again in the presence of AgNO <sub>3</sub>
mol kg <sup>-1</sup> , and    is a sa	alt bridge containing 0	.1 mol	crystals: b.p. 80 $\pm$ 0.1°C, and d <sup>25</sup> = 0.7766 g cm <sup>-3</sup> .
kg <sup>-1</sup> tetraethylammoniu	um picrate (Et <sub>4</sub> NPic) i	n the same	
solvent. The silver ion solution is obtained fro following equation:	activity in the saturation the e.m.f. data usin	ted ig the	Ethanol was purified using magnesium and iodine as described in ref. (2).
E = (RT/F) <i>ln</i> {(a <sub>Ag</sub>	$_{g}+)_{ref}/(a_{Ag}+)_{satd sin}$		
REFERENCES:			ESTIMATED ERROR:
(1) Kalidas, C.; Schneid 27, 477.	der, H. Electrochim.	Acta <u>1982</u> ,	Soly: the average deviation does not exceed $\pm$ 0.5 %.
(2) Subramanian, S.; Ka	alidas, C. Electrochim	n. Acta	Temp: precision ± 0.1 K.
<u>1984,</u> 29, 753.			
1			

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Kolthoff, I.M.; Chantooni, M.K.	
(2) Tetraethylammonium iodate; C <sub>8</sub> H <sub>20</sub> NIO <sub>3</sub> ;			
[61327-93-3]		J. Phys. Chem. <u>1973</u> , 77, 523-6.	
(3) Acetonitrile; $C_2H_3N$ ; [75-05-8]	1		
VARIABLES:		PREPARED BY:	
Concentration of $(C_2H_5)_4NIO_3$			
1/K = 298		H. Miyamoto	
EXPERIMENTAL DATA:			
Results based on potentiometric	measurements (for de	tails see compilations cited below).	
concn of	<b>-</b> .		
$(C_2H_5)_4NIO_3$	$E_1 -lo$	$g K_{s0} = 10^{11} K_{s0}^{s}$	
	III V	more diff-o	
0.00317	-338 1	0.57 2.60	
0.00951	-370 1	$0.7_0$ $2.0_0$	
	averages: 1	0.6 2.3	
<sup>a</sup> Calculated by compiler.			
	ATIVIT 14DV 11	VEODMATION	
	AUXILIART II		
METHOD/APPARATUS/PROCE	DURE:	SOURCE AND PURITY OF MATERIALS:	
$K_{s0}$ values based on emf measuren	nents on the cell:	Acetonitrile was obtained and purified as described in	
		ref. 2 of the compilation cited on the left. Additional	
Ag, AgIO <sub>3</sub>   salt( $c_1$ )    AgNO <sub>3</sub> (	C <sub>2</sub> ) [Ag [1]	details are also given in this compilation.	
For complete details, see the comp	vilations of the		
Agi $\Omega_{a}$ (CoH <sub>c</sub> ) Ni $\Omega_{a}$ water (or met	thanol) systems by		
these authors.			
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r <del></del>		T	
COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Kolthoff, I.M.; Chantooni, M.K.	
(2) Tetraethylammonium iodate; $C_8H_{20}NIO_3$ ;			
[01327-93-3] (2) Sulfinul hismathana (dimathul sulfavida): C-H-OS		J. Phys. Chem. <u>1973</u> , 77, 523-6.	
(5) Sulfinyl Dismethane (dimethyl i	$sunoxide); C_2 n_6 OS;$		
[07-08-0]			
VARIABLES:		PREPARED BY:	
Concentration of $(C_2H_5)_4NIO_3$ T/K = 298		H. Miyamoto	
EVDEDIMENTAL DATA.		1	
Results based on potentiometric	measurements (for det	ails see compilations cited helow)	
copen of			
(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> NIO <sub>3</sub>	E <sub>1</sub> -lo	$g K_{a0} = 10^{10} K_{a0}^{a}$	
mol dm-3	mV	mol <sup>2</sup> dm <sup>-6</sup>	
0.00432	-312	9.82 1.51	
0.0216	-347	$9.7_7$ $1.7_0^{-1.7_0}$	
	averages:	9.8 1.6	
<sup>a</sup> Calculated by compiler.			
AUXILIARY INF		FORMATION	
METHOD/APPARATUS/PROCEI	JURE:	SUURCE AND PURITY OF MATERIALS:	
$K_{so}$ values based on emf measuren	aents on the cell:	Dimethyl suitoxide was obtained and purified as	
$  Ag, AgiO_3   sait(c_1)    AgNO_3(c_1)    AgNO_3(c_2)    AgNO_3$	2)   Ag [1]	details given in the compilation sized on the left	
For complete details, see the comp	vilations of the	uctans given in the compliation cited on the left.	
A gloar (Calla), NIO-awater (or met	thanol) systems hy		
these authors	manory systems by		
i mose aumers.			
234 Silver		r lodate	
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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Silver iodate; AgIO <sub>3</sub> ; [7783-97-3]		Nayak, B.; Dash, U.N.	
(2) Sodium perchlorate; NaClO <sub>4</sub> ; [7601-89-0]		Thermochin	n. Acta <u>1973,</u> 6, 223-9.
(3) Formamide; CH	<sub>9</sub> NO; [75-12-7]		
VARIABLES:		PREPARED	BY:
Concentration of Na $T/K = 298.15$ 303.1	$aClO_4$	H Miyamo	a and F.M. Woolley
17R = 290.19, 909.	15 and 500.15		o and E.M. Wooney
EXPERIMENTAL I	DATA:		
The tables below lis	it the solubility of $AgIO_3$ , S, in NaCl	O <sub>4</sub> /formamid	e solutions.
+/00	NaClO <sub>4</sub> concn	104S	$-log S^*$
1/00			(eq. [1] below)
25	0.14040 2	692	3.6536
	0.09568 2	.585	3.6601
	0.06089 2	.490	3.6647
	0.05912 2	.471	3.6672
	0.03200 2	.388	3.6686
	0.01836 2	2.371	3.6619
	0.01592 2	.360	3.6617
20	0.14040		
30	0.14240	1.383	3.5551
	0.09918	5,133	3.5780
	0.04964	2.944	3.5873
	0.03134	2.862	3.5898
	0.02980	2.788	3.6002
	0.01665	2.690	3.6059
	0.00893	2.500	3.6289
			continued
	AUXILIARY IN	FORMATIO	N
METHOD/APPARATUS/PROCEDURE:		SOURCE A	ND PURITY OF MATERIALS:
Solutions were prep	ared by dissolving weighed amounts	AgIO <sub>3</sub> prepo	d by mixing dil solutions of c.p. grade
of NaClO <sub>4</sub> in know	n (weighed) amounts of formamide.	AgNO <sub>3</sub> and twice-recrystalized KIO <sub>3</sub> . The ppt was	
These mixtures wer	e placed in amber-colored	aged for several days in the mother sln, washed, and	
glass-stoppered bot	tles containing excess AgIO <sub>3</sub> . The	dried in a v	acuum oven at 60°C. NaClO <sub>4</sub> prepd from
bottles were stopped	red and heavily paraffined, and then	pure Na <sub>2</sub> CO	3 and a slight excess of dil HClO <sub>4</sub> followed
rotated in a water t	hermostat at a specified tempera-	by recrystall	ization above 50°C. The product was dried
ture. Saturation wa	s reached within 7 to 8 hours as	in a current	of dry air at 250°C. Commercial
confirmed by analy	ses.	formamide v	was treated with CaO and distilled at
		reduced pres	ssure.
AgIO <sub>3</sub> in the satd s	Ins detd iodometrically using 0.01	ESTIMATE	D ERROR:
mol dm- <sup>3</sup> Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> sln and a calibrated buret. The		Soly: titrns accurate to $\pm$ 0.2 %.	
$Na_2S_2O_3$ sins were s	standardized with $K_2Cr_2O_7$ .	Temp: precis	sion ± 0.01 K.
		REFERENC	ES:
		1. Agarwal,	K.K.; Nayak, B. J. Phys. Chem. <u>1966,</u> 80, 57–71, 2062
		<u> </u>	<u></u> , r., 2002.

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		Silver Iodate		235
COMPONENTS: (1) Silver iodate;	AgIO <sub>3</sub> ; [7783-97-3]	ORIGINAL MEA Nayak, B.; Dash	ASUREMENTS: n, U.N.	
(2) Sodium perch	lorate; NaClO4; [7601-89-0]	Thermochim. A	cta 1973, 6, 223-9.	
(3) Formamide; C	CH3NO; [75-12-7]			
EXPERIMENTAL	DATA: (continued	)		
	NaClO <sub>4</sub> concn	104S	-log S*	
t/⁰C	mol dm-3	mol dm-3	(eq. [1] below)	
35	0.17470	3.784	3.5132	
	0.09668	3.545	3.5238	
ł	0.08196	3.492	3.5258	
ļ	0.06726	3.416	3.5302	
	0.05254	3.347	3.5382	
	0.02629	3.208	3.5371	
	0.01183	3.153	3.5320	
	0.01029	3.142	3.5316	
The solubility da	ta were fitted to eq. [1] whe	re values of A were taken for	rom ref. (1).	
	$\log S^* = \log S - AI^{1/2}$	$I(1 + I^{1/2}) = \log S^0 - BI$	[1]	

In eq. [1], I = [NaClO<sub>4</sub>] + S, and values of the slope B,  $log S^0$ , and the extrapolated solubility of AgIO<sub>3</sub> in pure formamide are given in the table below. Values of  $log S^*$  are give in the data tables above.

t∕⁰C	soly in pure CH <sub>3</sub> NO 104mol dm <sup>-3</sup>	10 <sup>8</sup> (soly) <sup>2a</sup> mol <sup>2</sup> dm <sup>-6</sup>	from equa B/dm <sup>3</sup> mol-	tion [1] 1 -log S <sup>0</sup>	$10^8 K_{s0} = (S^0)^2$ mol <sup>2</sup> dm <sup>-6</sup>
25	2.169	4.705	-0.0899	3.6683	4.606
30	2.488	6.190	-0.3331	3.6090	6.053
35	2.943	8.661	-0.1393	3.5366	8.448

Compilers' calculations.

The authors also give "standard" thermodynamic values for the dissolution of  $AgIO_3$  in formamide based on the following relations.

 $(dln K_{s0}/dT)_p = \Delta H/RT^2$  $\Delta G = -RTln K_{s0}$ 

$$\Delta S = (\Delta H - \Delta G)/T$$

The values of these thermodynamic parameters are given below.

	ΔG	$\Delta H$	ΔS
t∕⁰C	kcal mol-1	kcal mol-1	cal K <sup>-1</sup> mol <sup>-1</sup>
25	10.00	11.16	3.89
30	10.00	11.16	3.81
35	9.97	11.16	3.88

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