COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Noyes, A. A.; Kohr, D. A. *J. Am. Chem. Soc.* 1902, *24*, 1141-8.
VARIABLES:	**PREPARED BY:**
The solubility in water was measured at 25°C	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of Ag_2O in water at 25°C.

Conc. of Ag expressed as g AgI/250 ml

undersaturation	supersaturation
0.0125	0.0127
0.0130	0.0120
0.0125	0.0133
0.0102 [a]	0.0112 [a]

[a] These values were omitted by the authors in calculating the mean.

The mean value chosen by the authors is 0.0127 g AgI/250 ml which corresponds to 2.16×10^{-4} mol dm^{-3} as AgOH.

Compiler's note: This same article appears in *Z. Physik. Chem.* 1903, *42*, 36-42.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The Ag_2O-H_2O mixtures were rotated in a thermostat at 25°C for 4 or 5 hours, and then were allowed to settle for a short while. After this, the liquid phase was sucked out and passed through a filter. The silver content was determined gravimetrically as AgI. Equilibrium was approached from both undersaturation and supersaturation.

SOURCE AND PURITY OF MATERIALS:

The Ag_2O was prepared by adding a clear solution of $Ba(OH)_2$ to an aqueous solution of $AgNO_3$. The precipitate was washed with 4 liters of freshly boiled water. During the process the precipitate was kept out of contact with CO_2.

ESTIMATED ERROR:

About 5%.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Bottger, W. Z. *Physik. Chem.* 1903, *46*, 521-619.
VARIABLES: Temperature.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Saturated solutions of Ag_2O in water.

t/°C	10^6 sp.cond.[a]	$(l_{Ag+} + l_{OH-})$[b]	C_{AgOH}/mol dm^{-3}	K_s^o
19.94	29.27[c]	237.2	1.23×10^{-4}	1.52×10^{-8}
24.94	35.98	259.1	1.39×10^{-4}	1.93×10^{-8}

[a] No unit is given for this value but it appears to be $\Omega^{-1}cm^{-1}$.

[b] No unit is given for this value but it appears to be $\Omega^{-1}cm^2mol^{-1}$.

[c] This value is the average of two measurements.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Saturated solutions of Ag_2O in water were prepared by mixing the two components in a rotating conductance cell in a thermostat. The conductance of the solutions was measured after several days.

SOURCE AND PURITY OF MATERIALS:

All materials were of analytical reagent grade quality and were recrystallized several times before being used. The Ag_2O was prepared by adding a solution of $Ba(OH)_2$ to aqueous $AgNO_3$. The precipitate was washed several times with water. Conductivity water was used throughout.

ESTIMATED ERROR:

The uncertainty in the individual measurements was less than 1%. The calculated results have an uncertainty of about 5%.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Rebiere, G. *Bull. Soc. Chim.* 1915, *17*, 309-12.
VARIABLES: Method of preparing the Ag_2O and its solubility in water at 25°C and 50°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of Ag_2O in water.

	25°C		50°C	
Oxide [a]	C_{Ag_2O}/mg dm^{-3}	C_{Ag_2O}/mol dm^{-3} [b]	C_{Ag_2O}/mg dm^{-3}	C_{Ag_2O}/mol dm^{-3} [b]
I	50.00	2.16×10^{-4}	69.1	2.98×10^{-4}
II	51.9	2.23×10^{-4}	71.9	3.10×10^{-4}
III	53.8	2.32×10^{-4}	82.5	3.56×10^{-4}
IV	68.6	2.96×10^{-4}	90.4	3.90×10^{-4}

[a] The numbers refer to the method of preparation described below under "SOURCE AND PURITY OF MATERIALS".

[b] All these numbers have been recalculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

One gram of Ag_2O was added to 500 ml of water and the mixture was mechanically agitated for 2 hours in a constant temperature bath. The mixture was then filtered and the silver content was determined by adding ammoniacal KCN to the solution, then adding KI and titrating with dilute $AgNO_3$ to a bluish opalescence (1).

SOURCE AND PURITY OF MATERIALS:

Conductivity water was used as solvent. Ag_2O was prepared as follows, using pure materials: (I) adding NaOH to aqueous $AgNO_3$; (II) adding $Ba(OH)_2$ to aqueous $AgNO_3$; (III) action of concentrated NaOH on freshly precipitated AgCl; (IV) action of concentrated NaOH on freshly precipitated Ag_2CO_3. The Ag_2O formed was collected on a filter, washed, dried between papers, and dried in a vacuum over H_2SO_4.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Rebiere, G. *Bull. Soc. Chim.* 1915, *17*, 306.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Remy, H.; Kuhlmann, A. *Z. Anal. Chem.* 1924, *65*, 161-81.
VARIABLES: Method of measuring the solubility of Ag_2O in water.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of Ag_2O in water.

Method	C_{Ag_2O}/mg dm^{-3}	C_{Ag_2O}/mol dm^{-3}
Conductimetric titration	25.29	1.09×10^{-4}
Specific conductance	24.80	1.07×10^{-4}

The solubility determined by conductimetric titration probably has about a 10% uncertainty because of the uncertainty in determing the inflection points in the titration curves.

The solubility value determined from the specific conductance measurement has an unknown uncertainty from two sources: (a) the measurement was made at about 19.5°C and then corrected to 18°C before the solubility calculation was made; and (b) the authors introduce a correction for the presence of CO_2 in the conductivity water. The latter correction is subject to some dispute.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Warm Ag_2O was added to conductivity water and the mixture was shaken until equilibrium was established. This was determined as the time when the specific conductance of the solution became constant--after 1.5 hours. The mixture was then filtered and the filtrate was titrated conductimetrically with excess dilute H_2SO_4 and then back-titrated conductimetrically with dilute KOH. The solubility of Ag_2O was calculated as equivalent to the H_2SO_4 used in this titration. The solubility was also calculated from the specific conductance of the saturated solution, using literature values for the specific ionic conductances.

SOURCE AND PURITY OF MATERIALS:

Ag_2O was prepared by dissolving recrystallized $AgNO_3$ in conductivity water, adding freshly distilled NH_4OH, washing the precipitate, redissolving it in HNO_3, precipitating once again with NH_4OH, carefully washing the precipitate and heating it gently in a platinum crucible. Conductivity water was used throughout.

ESTIMATED ERROR:

No details are given. The temperature varied from 19 to 21°C during the measurements.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Mathur, R. P. P.; Dhar, N. R. *Z. Anorg. Allg. Chem.* 1931, *199*, 387-91.
VARIABLES: Method of measuring the solubility, and temperature.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Table I. Solubility of Ag_2O in water from analysis.

τ/°C	$10^4 C_{Ag}$/mol dm^{-3} [a]	$10^4 C_{Ag}$/mol dm^{-3} [b]
30	2.22	2.1
40	3.14	3.18
50	3.75	3.67
60	4.16	4.19
70	4.51	4.5
80	4.82	4.83

[a] Determined by weighing the residue after the solution had been evaporated to dryness.

[b] Determined gravimetrically by precipitating the Ag as AgCl.

Table II. Solubility of Ag_2O in water from e.m.f. measurements.

τ/°C	e.m.f./V	$10^4 C_{Ag}$/mol dm^{-3}
30	0.1552	1.981
40	0.1440	3.04
50	0.1462	3.61
60	0.163	4.09
70	0.165	4.48
80	0.165	4.79

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Three methods were used. (1) Ag_2O and conductivity water were shaken vigorously and then allowed to settle for 20 hours. A sample of the solution was evaporated to dryness and weighed, or the Ag^+ in solution was precipitated as AgCl and then weighed. (2) The e.m.f. of the cell Ag, 0.1 M $AgNO_3$ | M KNO_3 | (Ag_2O + H_2O), Ag was measured and C_{Ag} was calculated using the Nernst equation. (3) The specific conductance of the saturated solution was measured and the solubility was calculated from this value and the available values for the individual ionic conductances.

SOURCE AND PURITY OF MATERIALS:

Conductivity water was used throughout. The Ag_2O was prepared by mixing dilute aqueous $AgNO_3$ with aqueous NaOH. The precipitate was washed free of alkali with conductivity water.

ESTIMATED ERROR:

No details are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O, [20667-12-3]	Mathur, R. P. P.; Dhar, N. R. *Z. Anorg. Allg. Chem.* 1931, *199*, 387-91.
(2) Water, H_2O, [7732-18-5]	

EXPERIMENTAL VALUES: con't

Table III. Solubility of Ag_2O in water from conductance.

τ/°C	10^6 sp. cond./Ω^{-1} of solution	10^6 sp. cond./Ω^{-1} correction[a]	10^6 sp. cond./Ω^{-1} corrected	$10^4 c_{Ag}$/mol dm^{-3}
20	28.16	0.58	27.58	1.2
25	36.13	0.43	35.70	1.5
30	48.87	0.43	48.40	1.8

[a] Correction for the solvent conductance.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Britton, H. T. S.; Robinson, R. A. *Trans. Faraday Soc.* 1932, *28*, 531-45.
VARIABLES: Ionic strength of solution at 16°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility product of AgOH at 16°C.

equiv. of NaOH added	pH [a]	$10^8 K_s o$ [c]	pH [b]	$10^8 K_s o$ [c]
0.1	7.48	1.62	7.97	1.32
0.2	7.54	1.58	8.04	1.35
0.3	7.61	1.55	8.11	1.38
0.4	7.69	1.55	8.17	1.33
0.5	7.81	1.62	8.25	1.30
0.6	7.92	1.62	8.34	1.29
0.7	8.03	1.51	8.49	1.34
0.8	8.21	1.45	8.70	1.44
0.9	8.56	1.58	9.04	1.58
		average = 1.56		average = 1.37

[a] Original concentration of $AgNO_3$ solution was 0.1 mol dm^{-3}.

[b] Original concentration of $AgNO_3$ solution was 0.025 mol dm^{-3}.

[c] $K_s o = (C_{Ag^+}) \cdot (a_{OH^-})$

Using silver ion activity coefficients of 0.732 in 0.1 mol dm^{-3} solution and 0.840 in 0.025 mol dm^{-3} solution (1), the thermodynamic solubility product constant for AgOH is calculated to be 1.15×10^{-8}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

100 ml of $AgNO_3$ solution was titrated with NaOH solution having a concentration of 0.2 mol dm^{-3}. The pH of the solution was measured with a glass electrode. The silver ion concentration was calculated from the original concentration of the $AgNO_3$ and the amount of NaOH that had been added. No other experimental details are given. The purpose of the work was to illustrate the use of the glass electrode.

SOURCE AND PURITY OF MATERIALS:

No details are given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Lewis, G. N.; Randall, M. *Thermodynamics*, McGraw-Hill, New York, 1923, p. 362.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Johnston, H. L.; Cuta, F.; Garrett, A. B. *J. Am. Chem. Soc.* 1933, 55, 2311-25.
VARIABLES: The temperature was 25°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of Ag_2O in pure water at 25°C.

$10^4 C_{Ag^+}$/mol kg^{-1}	
from undersaturation	from supersaturation
2.21	2.18
2.23	2.32
2.19	2.16
2.18	2.31
2.15	2.28
2.23	
average = 2.20	= 2.25

The average of all determinations is 2.22×10^{-4} mol/kg H_2O.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Mixtures of Ag_2O and conductivity water were agitated for 10 to 18 days in a thermostat and then allowed to sediment 5 to 7 days in another thermostat at 25°C. The clear solution was siphoned off under N_2 pressure and forced through a silver filter. The silver content was determined by a potentiometric titration with a dilute solution of KI. Equilibrium was approached from both undersaturation and supersaturation.	Conductivity water was prepared and stored in contact with CO_2-free air. The Ag_2O was prepared by adding, dropwise and simultaneously, dilute solutions of $AgNO_3$ and $Ba(OH)_2$, into hot conductivity water. The precipitate was washed 15 times with conductivity water. The entire process was carried out in a N_2 atmosphere.
	ESTIMATED ERROR: In most determinations it was well below 1% and did not exceed 2%.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver(I) hydroxide; AgOH; [12258-15-0] (2) Water; H_2O; [7732-18-5]	Nasanen, R.; *Suomen Kemistilehti* 1943, *16B*, 1-3.
VARIABLES:	**PREPARED BY:**
Ionic strength of the solution at 25°C.	T. P. Dirkse

EXPERIMENTAL VALUES:

No titration data are given in the article, but only the following calculated results.

Solubility Product of silver(I) hydroxide at 25°C.

$\sqrt{\mu}$ [a]	$10^3 P$ [b]	$pK_s o$ [c]
0.0354	0.756	7.569
0.0659	0.808	7.511
0.0659	0.800	7.520
0.302	0.972	7.351
0.505	1.075	7.253[d]
1.000	1.32	7.083
1.370	1.29	7.106

[a] μ is the ionic strength of the solution as mol dm^{-3}.

[b] P is the reciprocal of the maximum slope of the titration curve.

[c] $pK_s o$ is calculated from the relationship: $P = 4.606\ (K_s o)^{\frac{1}{2}}$.

[d] Compiler's note: this should be 7.263.

From the above results and the use of the Debye-Huckel equation for activity coefficients, the author calculates the thermodynamic solubility product of AgOH to be 2.57×10^{-8}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Dilute aqueous $AgNO_3$ was titrated potentiometrically with aqueous KOH under a N_2 atmosphere in a thermostat at 25°C. The solution was stireed and varying amounts of KNO_3 were added to control the ionic strength of the solution. A Ag_2O/Ag electrode served as the indicator electrode. By means of equations developed earlier (1, 2), the maximum slope of the titration curve was calculated and related to the solubility product.

SOURCE AND PURITY OF MATERIALS:

No information is given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Nasanen, R. *Z. Physik. Chem.* 1941, *188A*, 272.
2. Nasanen, R. *Z. Physik. Chem.* 1942, *190A*, 183.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Silver (I) oxide; Ag_2O; [20667-12-3] (2) Water; H_2O; [7732-18-5]	Gavrish, M. L. : Galinker, I. S. *Zh. Neorg. Khim.* 1970, *15*, 1979-81; *Russ. J. Inorg. Chem.* (*Engl. transl.*) 1970, *15*, 1017-9.
VARIABLES: Temperature from 25 to 260°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of Ag_2O in water at elevated temperatures.

t/°C	C_{Ag_2O}/g kg^{-1}	$10^4 C_{Ag_2O}$/mol kg^{-1} [a]
25	0.022	0.95
130	0.52	22.4
150	0.64	27.6
180	0.64	27.6
200	0.63	27.2
210	0.55	23.7
220	0.48	20.7
230	0.46	19.9
245	0.22	9.5
250	0.23	9.9
260	0.22	9.5

[a] The mol/kg H_2O values were calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Very little information is given. The Ag_2O and water were placed in an autoclave which is described rather completely. No indication is given as to how long the mixtures were in the autoclave or the method that was used to determine the silver content of the solutions.	No details are given.
	ESTIMATED ERROR: No details are given.
	REFERENCES: