COMPONENTS:	EVALUATOR:
1. Manganese (II) sulfite; $MnSO_3$; [13568-71-3] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. April 1983.

CRITICAL EVALUATION:

Manganese sulfite crystallizes from aqueous solutions in the form of several hydrates. The formation of the various hydrates depends on temperature, amount of sulfurous acid, and preparation technique.

Two different trihydrates, monoclinic α-$MnSO_3.3H_2O$ (1-3) [60365-38-0] and orthorhombic β-$MnSO_3.3H_2O$ (4) [60365-38-0], and $MnSO_3.5/2H_2O$ (2,5-6) [75042-11-4] are reported to exist at room temperature. At higher temperatures $MnSO_3.2H_2O$ (2) [75042-12-5] and $MnSO_3.H_2O$ (1,7-9) [65410-83-5] are formed. The existence of a $MnSO_3.\frac{1}{2}H_2O$ [60365-38-0] (10) has not been fully verified.

The solubility of these hydrates has not yet been throroughly investigated. Several authors report that manganese sulfite is insoluble in water (7,11-12), readily soluble in sulfurous acid (7) or in other acids, undergoing decomposition (11,12). Only Gorgeu (7) and Rodin *et al.* (13) give some numerical data, namely for $MnSO_3.3H_2O$, $MnSO_3.2.5H_2O$, and $MnSO_3.1H_2O$. It is not known which of the two different trihydrates Gorgeu investigated, but it seems to be the monoclinic α-$MnSO_3.3H_2O$ (2). The data given by Gorgeu (7) are 0.1 g $MnSO_3$/kg H_2O ($m(MnSO_3) = 7.4 \times 10^{-4}$ mol kg^{-1}) at room temperature (cold water) and 0.2 g $MnSO_3$/kg H_2O ($m(MnSO_3) = 1.5 \times 10^{-3}$ mol kg^{-1}) in hot water. The solubility given by Gorgeu seems to be rather too high, because the samples used were probably not fully free of sulfate. Rodin *et al.* (13) report that the solubility of $MnSO_3.2.5H_2O$ in water increases from 6.93×10^{-3} mass % ($m(MnSO_3) = 5.13 \times 10^{-4}$ mol kg^{-1}) at 293 K to 1.23×10^{-2} mass % ($m(MnSO_3) = 9.13 \times 10^{-4}$ mol kg^{-1}) at 343 K. The solubility of $MnSO_3.1H_2O$ is said to be 1.48×10^{-2} mass % ($m(MnSO_3) = 1.10 \times 10^{-3}$ mol kg^{-1}) (13) at 363 K.

TENTATIVE VALUE

The solubility of $MnSO_3$ (i.e. of the hydrates present) in water at room temperature is approximately 5×10^{-4} mol kg^{-1} (molality).

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COMPONENTS:	EVALUATOR:
1. Manganese (II) sulfite; $MnSO_3$; [13568-71-3] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. April 1983.

CRITICAL EVALUATION: (continued)

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Manganese sulfite; $MnSO_3$; [13568-71-3] 2. Water; H_2O; [7732-18-5]	Rodin, I.V.; Margulis, E.V. *Zh. Neorg. Khim.* 1983, 28, 258-9; *Russ. J. Inorg. Chem. (Eng. Transl.)* 1983, 28, 144.
VARIABLES:	PREPARED BY:
Four temperatures: 293 - 363 K	B. Engelen

EXPERIMENTAL VALUES:

t/°C	$MnSO_3$	
	10^4 mass %	10^4m/mol kg^{-1}[a]
20[b]	69.3	5.134
50[b]	95.4	7.067
70[b]	123.2	9.127
90[c]	148.4	10.994

[a] Calculated by the compiler.

[b] The solid phase is claimed to be $MnSO_3.2.5H_2O$ [75042-11-4].

[c] The solid phase is claimed to be $MnSO_3.1H_2O$ [65410-83-5].

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:

Saturation method. Equilibrium was established by stirring the saturated solutions in thermostatically controlled glass tubes. Equilibrium was tested for analytically - 3 hr was reported to be sufficient. Manganese was determined titrimetrically using peroxodisulfate/Ag^+.

SOURCE AND PURITY OF MATERIALS:

Not well defined.

ESTIMATED ERROR:

Not given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Manganese sulfite; $MnSO_3$; [13568-71-3] 2. Carbon dioxide; CO_2; [124-38-9] 3. Sulfur dioxide; SO_2; [7746-09-5] 4. Water; H_2O; [7732-18-5]	Gorgeu, A. *C. R. Hebd. Seances Acad. Sci.* 1883, *96*, 341-3.
VARIABLES: Two approximate temperatures CO_2 and SO_2 content	PREPARED BY: B. Engelen

EXPERIMENTAL VALUES:
Solubility of manganese sulfite in cold water and hot water, and in cold water saturated with CO_2 or SO_2 is reported.

Temperature	Solvent	g $MnSO_3$/ kg solvent	m($MnSO_3$)/mol kg^{-1}[a]
cold	pure water	0.1	7.4×10^{-4}
hot	pure water	0.2	1.5×10^{-3}
cold	water saturated with CO_2	1[b]	7.4×10^{-3}[c]
cold	water saturated with SO_2	150-170	1.11 - 1.26

[a] Calculated by the compiler.
[b] Units are in g/dm^3 solvent.
[c] Units are in mol/dm^3 solvent.

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not given.	$MnSO_3.3H_2O$ was prepared by precipitation from an aqueous solution of $MnCl_2$ with alkaline sulfite, added in small portions. The sulfite contained 2-3% of sulfate (author).
	ESTIMATED ERROR:
	REFERENCES: