COMPONENTS:	EVALUATOR:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. August 1984.

CRITICAL EVALUATION:

Zinc sulfite crystallizes from aqueous solutions in the form of various hydrates, $ZnSO_3.nH_2O$, with n = 3, 5/2, 2, and 1 (1-4). The formation of these hydrates depends on temperature, composition of the solution, especially the amount of sulfurous acid, and preparation technique. Furthermore several basic zinc sulfite hydrates (5-7) and double salts with alkali sulfites (1,6,8) exist. The existence of the following zinc sulfite hydrates has been confirmed: $ZnSO_3.3H_2O$ [75042-13-6] (2), three polymorphic forms of $ZnSO_3.5/2H_2O$ [14460-28-7] (α (3,9,10), β (2,9) and γ (2,9)), $ZnSO_3.2H_2O$ [7488-52-0] (3), and two polymorphic forms of $ZnSO_3.1H_2O$ [66516-57-2] (α (1,4) and β (1,4)). The trihydrate crystallizes from aqueous solutions below 275 K, the three forms of $ZnSO_3.5/H_2O$ at ambient temperature (2,5,9,10), the dihydrate at temperatures above 338 K (2,5), and the α-monohydrate at temperatures above 363 K in the presence of excess of sulfur dioxide (2).

The solubility of zinc sulfite in water has not been thoroughly investigated. Numerical data are scarce (8,11-15). In 1890, Heuston *et al.* (11) reported that the solubility of $ZnSO_3.2H_2O$ in water is 1.1 x 10^{-2} mol kg^{-1} (molality) (0.16 mass % $ZnSO_3$). Murooka *et al.* (8) report the solubility of $ZnSO_3.2\ 1/2H_2O$ in water to be 1.733 x 10^{-2} mole/kg soln at 298.2 K. Because of the finding that α-$ZnSO_3.5/2H_2O$ is the stable hydrate at ambient temperature (2), it is assumed that both authors (8,11) have had α-$ZnSO_3.5/2H_2O$ as solid phase. In 1983, Margulis *et al.* (15) determined 5 values of the solubility of $ZnSO_3.5/2H_2O$ (presumably the α-form) from 0.1786 mass % $ZnSO_3$ ($m(ZnSO_3)$ = 0.0123 mol kg^{-1}) at 293 K to 0.1939 mass % (0.01336 mol kg^{-1}) at 368 K.

TENTATIVE VALUE

The solubility of α-$ZnSO_3.5/2H_2O$ in water at ambient temperature is approximately 1 x 10^{-2} mol kg^{-1} (molality scale) (1.5 g $ZnSO_3$/kg H_2O). The temperature coefficient of solubility is positive.

The solubility of zinc sulfite in water is affected by the presence of a third compound. This is shown by some experimental data on the systems $ZnSO_3$-SO_2-H_2O (12-14), $ZnSO_3$-Na_2SO_3-H_2O (8,15), and $ZnSO_3$-$ZnSO_4$-SO_2-H_2O (13-15). The solubility of zinc sulfite increases with increasing concentration of sulfurous acid (12-14) or increasing partial pressure of sulfur dioxide (13,14), and slightly with increasing sulfate content (13-15). In solutions containing Na_2SO_3, the solubility decreases with up to 1.1 mass % of Na_2SO_3 and increases at higher concentrations (15). It has been further claimed that zinc sulfite is nearly insoluble in alcohol and ether (16).

The numerical data on the solubility of zinc sulfite (presumably α-$ZnSO_3.2\ 1/2H_2O$) in the presence of excess of sulfurous acid given by Terres *et al.* (12), Peisakhov *et al.* (13),

COMPONENTS:	EVALUATOR:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. August 1984.

CRITICAL EVALUATION: (continued)

and Kuz'minykh *et al.* (14) are not directly comparable, but seem to be in satisfactory agreement. Figures 1 and 2 show graphs derived (by evaluator) from data reported by Kuz'minykh *et al.* (14) and Terres *et al.* (12). Figure 1 indicates that there is a linear increase of solubility with increasing SO_2 content. The following equation is fitted to the data obtained by Kuz'minykh *et al.* (14) and Terres *et al.* (12) at 293.5 K and 298 K, respectively,

$$m(ZnSO_3) = 0.035 + 0.436 \times m(SO_2 \text{ tot}) \quad (1)$$

The correlation coefficient is 0.997. This equation and the graph in Figure 1 is approximately valid (deviation < 2.2 %) for other temperatures from 280 to 360 K.

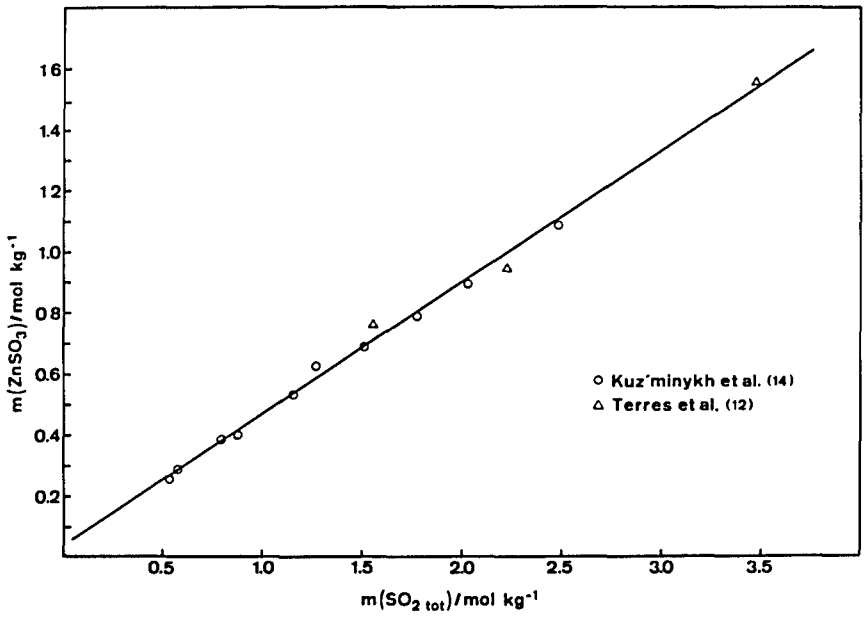

Fig. 1 Solubility of zinc sulfite (presumably α-$ZnSO_3.2\ 1/2H_2O$) in aqueous sulfurous acid solutions, as recommended for 293 - 298 K (equation 1).

COMPONENTS:	EVALUATOR:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. August 1984.

CRITICAL EVALUATION: (continued)

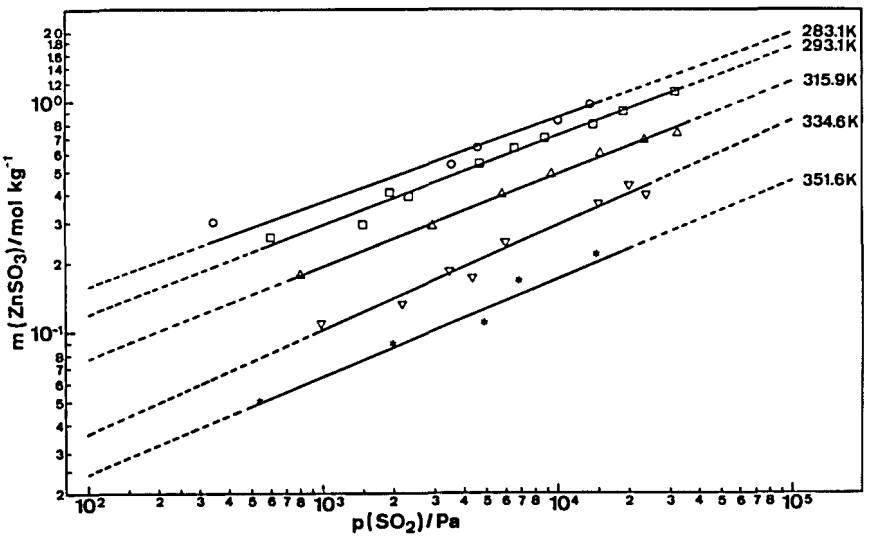

Fig. 2 Solubility of zinc sulfite (presumably α-$ZnSO_3$.2 1/2H_2O) in aqueous sulfurous acid solutions, *vs.* partial pressure of sulfur dioxide (14).

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12. Terres, E.; Ruhl, G. *Angew. Chem.* 1934, *47*, 332.

COMPONENTS:	EVALUATOR:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Water; H_2O; [7732-18-5]	H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany. August 1984.

CRITICAL EVALUATION: (continued)

13. Peisakhov, I.L.; Karmazina, V.D. *Zh. Prikl. Khim.* 1959, *32*, 70; **J. Appl. Chem. USSR (Eng. Transl.)* 1959, *32*, 71.

14. Kuz'minykh, I.N.; Kuznetsova, A.G. *Zh. Prikl. Khim.* 1954, *27*, 816; **J. Appl. Chem. USSR (Eng. Transl.)* 1954, *27*, 765.

15. Margulis, E.V.; Rodin, I.V. *Zh. Neorg. Khim.* 1981, *26*, 2269; *Russ. J. Inorg. Chem. (Eng. Transl.)* 1981, *26*, 1221.

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COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Water; H_2O; [7732-18-5]	Heuston, F.T.; Tichborne, C.R. *Br. Med. J.* 1890, 1063.
VARIABLES: Room temperature	**PREPARED BY:** B. Engelen

EXPERIMENTAL VALUES:

The solubility of zinc sulfite in water at room temperature is reported to be

0.16 mass %

= 0.011 mol kg^{-1} (molality, compiler).

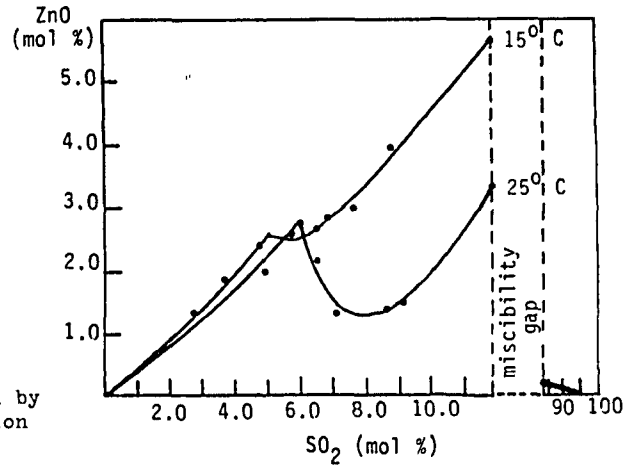
AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not given, but probably saturation method. Sulfite was determined iodometrically.	Zinc sulfite was obtained by precipitation from zinc sulfate solutions with sodium sulfite.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Sulfur dioxide; SO_2; [7446-09-5] 3. Water; H_2O; [7732-18-5]	1. Terres, E.; Ruhl, G. *Angew. Chem.* 1934, *47*, 332-4. 2. Terres, E.; Ruhl, G. *Beitrage zur Chemie der schwefligen Saure, Beiheft zu den Zeitschriften des Vereins deutscher Chemiker No 8*, 1934.
VARIABLES: Two temperatures: 288 and 298 K Concentration of SO_2	PREPARED BY: H.D. Lutz, B. Engelen

EXPERIMENTAL VALUES:

The authors report the solubility of $ZnSO_3.5/2H_2O$ [14460-28-7] in aqueous sulfurous acid solutions at 15 and 25°C. In the first paper, the experimental data are given in a graph. Numerical data are reported in the second paper.



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AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
SO_2-H_2O mixtures were treated together with solid zinc sulfite in closed glass ampoules at the stated temperatures. The solutions obtained were filtered through a fine glass frit and after oxidation of sulfite were analysed for sulfate and zinc content.	Zinc sulfite was precipitated from a solution of zinc sulfite with Na_2SO_3.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Sulfur dioxide; SO_2; [7446-09-5] 3. Water; H_2O; [7732-18-5]	1. Terres, E.; Ruhl, G. *Angew. Chem.* 1934, 47, 332-4. 2. Terres, E.; Ruhl, G. *Beitrage zur Chemie der schwefligen Saure, Beiheft zu den Zeitschriften des Vereins deutscher Chemiker No 8*, 1934.

EXPERIMENTAL VALUES (continued):

Composition of saturated solutions

SO_2 mol %	ZnO mol %	m(ZnO)[a] mol kg^{-1}	Solid phase
Temperature = 15°C			
2.68	1.27	0.73	$ZnSO_3.5/2H_2O$
3.70	1.84	1.08	"
4.70	2.37	1.42	"
5.43	2.49	1.50	$Zn(HSO_3)_2$?
6.48	2.64	1.61	"
6.80	2.80	1.72	"
7.56	2.89	1.79	"
8.75	3.92	2.49	"
11.90[b]	5.62	3.78	"
Temperature = 25°C			
2.68	1.32	0.76	$ZnSO_3.5/2H_2O$
3.78	1.62	0.95	"
4.86	1.98	1.18	"
5.72	2.58	1.56	"
6.45	2.16	1.31	$Zn(HSO_3)_2$?
7.05	1.32	0.80	"
8.66	1.39	0.86	"
9.10	1.48	0.92	"
11.82[b]	3.32	2.17	"

[a] Compilers.

[b] Between 11.9 and 84 mol % SO_2 the mixtures separate into two liquid layers.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Zinc sulfate; $ZnSO_4$; [7733-02-0] 3. Sulfur dioxide; SO_2; [7446-09-5] 4. Water; H_2O; [7732-18-5]	Kuz'minykh, I.N.; Kuznetsova, A.G. *Zh. Prikl. Khim.* 1954, 27, 816-21; **J. Appl. Chem. USSR (Eng. Transl.)* 1954, 27, 765-70.
VARIABLES: Five temperatures: 283 - 351 K Partial pressure and concentration of sulfur dioxide Concentration of zinc sulfate	PREPARED BY: B.Engelen

EXPERIMENTAL VALUES:

The authors report the composition of saturated solutions of zinc sulfite containing various amounts of zinc sulfate and excess of sulfur dioxide. The partial pressure of sulfur dioxide over the solutions is also given.

t/°C	p_{SO_2}	p_{SO_2}[a]	SO_4^{2-}	total SO_2	free SO_2[b]	Zn	$m(ZnSO_3)$[c]
	mm Hg	10^2Pa	mass %	mass %	mass %	mass %	mol kg^{-1}
9.9	2.55	3.39	0.381	3.822	2.022	2.099	0.2998
	26.36	35.14	0.323	6.628	3.588	3.322	0.5288
	34.06	45.40	0.76	7.703	4.161	4.142	0.6326
	74.54	99.37	0.99	9.95	5.532	5.204	0.8224
	101.43	135.22	0.465	11.78	6.345	5.875	1.0361
20.3	4.50	5.99	0.48	3.275	1.719	1.59	0.2566
	11.04	14.71	0.16	3.5	1.75	1.907	0.2892
	14.48	19.30	0.357	5.153	2.787	2.66	0.4021
	17.44	23.25	0.246	4.72	2.418	2.52	0.3884
	34.84	46.44	0.46	6.62	3.547	3.45	0.5360
	48.88	65.16	0.3	7.227	3.655	3.65	0.6277
	65.96	87.93	0.5	8.397	4.545	4.21	0.6919
	104.67	139.54	0.72	9.621	5.321	4.88	0.7919

a,b,c See the following page.

(continued on next page)

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Aqueous solutions of sulfurous acid were kept over zinc sulfite precipitate in several thermostatically controlled glass vessels, joined in series, as part of a special apparatus for determination of the equilibrium pressure of SO_2. The supernatant solution in the last vessel was analysed for total SO_2 content, for sulfate (from oxidation of the sulfite), and for zinc content. The equilibrium pressure of SO_2 was determined dynamically by passing oxygen-free N_2 gas through the vessels and analysing the moist inert gas for SO_2 with iodine and thiosulfate. The same was done with solution-precipitate mixtures containing different amounts of sulfate. Also the density of the solutions was measured at 20°C.	Not given.
	ESTIMATED ERROR: Not given. The figures are mean values of several measurements. The authors report good agreement.
	REFERENCES:

COMPONENTS:

1. Zinc sulfite; $ZnSO_3$; [13597-44-9]
2. Zinc sulfate; $ZnSO_4$; [7733-02-0]
3. Sulfur dioxide; SO_2; [7446-09-5]
4. Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Kuz'minykh, I.N.; Kuznetsova, A.G.

Zh. Prikl. Khim. 1954, 27, 816-21;
**J. Appl. Chem. USSR (Eng. Transl.)* 1954, 27, 765-70.

EXPERIMENTAL VALUES (continued):

t/°C	p_{SO_2}	$p^a_{SO_2}$	SO_4^{2-}	total SO_2	free $SO_2{}^b$	Zn	$m(ZnSO_3)^c$
	mm Hg	10^2Pa	mass %	mass %	mass %	mass %	mol kg^{-1}
20.3	142.2	189.58	0.53	10.81	6.015	5.27	0.8975
	232.8	310.37	0.48	12.51	6.82	5.813	1.0938
42.7	5.95	7.93	0.214	2.14	1.07	1.27	0.1733
	21.89	29.18	0.35	3.456	1.728	2.025	0.2864
	43.24	57.64	0.27	4.863	2.512	2.586	0.3976
	70.0	93.32	0.07	5.797	2.996	2.91	0.4793
	113.17	150.88	0.424	7.193	3.84	3.713	0.5902
	174.1	232.11	0.342	8.23	4.445	4.098	0.6765
	238.55	318.04	0.483	9.219	5.239	4.396	0.7232
61.4	7.28	9.70	0.1845	1.359	0.679	0.833	0.1087
	16.17	21.55	0.303	1.795	0.971	1.049	0.1328
	25.63	34.17	0.342	2.645	1.516	1.387	0.1832
	32	42.66	0.76	3.001	1.956	1.59	0.1723
	44.76	59.67	0.471	3.142	1.654	1.84	0.2456
	84.42	112.55	0.877	4.1	2.28	2.46	0.3069
	110.7	147.58	0.418	4.652	2.528	2.455	0.3585
	148.63	198.15	0.733	5.55	3.03	3.082	0.4340
	175.4	233.84	0.75	5.48	3.204	2.835	0.3906
78.4	4.03	5.37	0.267	0.631	0.315	0.505	0.0500
	14.7	16.59	0.168	1.112	0.556	0.683	0.0885
	36.17	48.22	0.33	1.646	0.971	0.914	0.1085
	50.69	67.58	0.27	2.208	1.206	1.208	0.1623
	107.7	143.58	0.1343	2.979	1.646	1.453	0.2180
20.3	2.81	3.75	8.95	1.665	1.019	6.756	0.1220
	14.79	19.71	6.233	4.23	2.413	6.101	0.3399
	19.24	25.65	7.52	4.175	2.172	7.17	0.3853
	19.3	25.73	2.637	4.547	2.61	3.776	0.3395
	19.88	26.50	4.45	4.38	2.394	5.062	0.3600
	23.05	30.73	8.409	4.418	2.23	7.96	0.4311
	25.98	34.63	9.26	4.075	2.103	8.33	0.3929
	30.48	40.63	0.935	6.57	3.43	4.018	0.5539
	41.34	55.11	12.38	2.761	1.88	10.38	0.3995

a,b,c See the following page.

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COMPONENTS:

1. Zinc sulfite; $ZnSO_3$; [13597-44-9]
2. Zinc sulfate; $ZnSO_4$; [7733-02-0]
3. Sulfur dioxide; SO_2; [7446-09-5]
4. Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Kuz'minykh, I.N.; Kuznetsova, A.G.

Zh. Prikl. Khim. 1954, 27, 816-21;
**J. Appl. Chem. USSR (Eng. Transl.)* 1954, 27, 765-70.

EXPERIMENTAL VALUES (continued):

t/°C	p_{SO_2}	p_{SO_2}[a]	SO_4^{2-}	total SO_2	free SO_2[b]	Zn	$m(ZnSO_3)$[c]
	mm Hg	10^2Pa	mass %	mass %	mass %	mass %	mol kg^{-1}
20.3	37.33	49.76	11.36	3.968	2.034	9.7	0.4026
	40.24	53.64	3.578	6.15	3.445	5.203	0.4963
	49.41	65.87	4.233	6.063	3.18	5.83	0.5365
	56.47	75.28	5.01	5.79	3.341	6.498	0.4622
	60.19	80.24	9.464	5.105	2.713	8.89	0.4878
	66.76	89.00	8.33	5.56	3.301	7.98	0.4513
	70.08	93.43	6.4	6.217	3.338	7.307	0.5612
	76.5	101.99	11.08	4.962	2.808	9.75	0.4531
	79.62	106.15	8.034	6.155	3.27	8.42	0.5819
	83.56	111.40	8.47	5.522	3.04	8.306	0.4986
	85.54	114.04	17.2	3.476	2.025	13.2	0.3425
	92.52	123.34	12.98	4.969	2.714	11.15	0.4964
	108.0	143.98	18.00	3.56	2.082	13.5	0.3552
	134.7	179.58	16.33	4.431	2.464	13.14	0.4645
	136.8	182.38	8.375	7.076	3.99	8.86	0.6364
	176.2	234.91	8.064	7.54	4.077	9.099	0.7179

[a] Calculated by the compiler.

[b] Excess over the amount necessary to form the monosulfite.

[c] Calculated from the concentration of combined SO_2 (amount necessary to form the monosulfite = SO_2 - free SO_2) by the compiler.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Zinc sulfate; $ZnSO_4$; [7733-02-0] 3. Sulfur dioxide; SO_2; [7446-09-5] 4. Water; H_2O; [7732-18-5]	Peisakhov, I.L.; Karamazina, V.D. *Zh. Prikl. Khim.* 1959, *32*, 70-8; **J. Appl. Chem. USSR (Eng. Transl.)* 1959, *32*, 71-7;
VARIABLES: Concentration of sulfur dioxide and sulfate	PREPARED BY: H.D. Lutz

EXPERIMENTAL VALUES:
The authors report the composition and the partial pressure of sulfur dioxide of saturated solutions of zinc sulfite containing various amounts of zinc sulfate and excess sulfur dioxide.

Composition of saturated solutions[a]								pH[b]	Partial pressure of SO_2[c]	
g/dm^3					10^2c/mol dm^{-3} (compiler)				mm Hg	10^2Pa
$ZnSO_4$	$Zn(HSO_3)_2$	Zn^{2+}	SO_2 total	SO_2 free[d]	$ZnSO_4$	$Zn(HSO_3)_2$	SO_2 total			(compiler)
4.52	5.32	3.38	2.98	0	2.80	2.34	4.65	4.8	0.057	0.076
3.52	10.2	4.44	5.84	0	2.18	4.5	9.12	4.2	0.149	0.199
8.1	13.9	7.25	7.97	0.19	5.0	6.1	12.44	4.2	0.465	0.620
4.44	13.9	5.79	7.83	0	2.75	6.1	12.22	3.9	0.302	0.403
3.71	24.2	8.47	14.0	0.26	2.30	10.6	21.9	3.6	1.68	2.24
6.6	25.6	10.05	15.0	0.58	4.1	11.3	23.4	3.6	1.67	2.23
11.4	39.3	15.9	23.65	1.54	7.1	17.3	36.92	3.15	3.8	5.1
9.35	41.4	15.6	25.0	1.73	5.79	18.2	39.0	3.4	3.6	4.8
24.8	5.56	11.62	3.36	0.23	15.4	2.44	5.24	4.3	0.206	0.275
26.8	41.3	22.7	23.7	0.45	16.6	18.2	37.0	3.0	6.70	8.93
55	3.86	23.4	2.21	0.32	34	1.70	3.45	4.05	0.07	0.09

a,b,c,d See the following page.

(continued on next page)

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Nitrogen was passed through thermostatically controlled absorption flasks containing a pulp of solid zinc sulfite and dissolved $Zn(HSO_3)_2$ and $ZnSO_4$. The partial pressure of SO_2 over the pulp was determined by analysing the gas emerging from the absorption flasks for its SO_2 content, by passing the gas through an absorption flask containing iodine solution. The saturated solutions in the pulp were analysed for SO_2 and Zn after the end of each experiment (method not given).	Not given.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS

1. Zinc sulfite; $ZnSO_3$; [13597-44-9]
2. Zinc sulfate; $ZnSO_4$; [7733-02-0]
3. Sulfur dioxide; SO_2; [7446-09-5]
4. Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Peisakhov, I.L.; Karamazina, V.D.

Zh. Prikl. Khim. 1959, *32*, 70-8;
**J. Appl. Chem. USSR (Eng. Transl.)* 1959, *32*, 71-7;

EXPERIMENTAL VALUES (continued):

Composition of saturated solutions[a]								pH[b]	Partial pressure of SO_2[c]	
g/dm^3					10^2c/mol dm^{-3} (compiler)					
$ZnSO_4$	$Zn(HSO_3)_2$	Zn^{2+}	SO_2 total	SO_2 free[d]	$ZnSO_4$	$Zn(HSO_3)_2$	SO_2 total		mm Hg	10^2Pa (compiler)
53.2	6.14	23.3	3.5	0.05	33.0	2.70	5.5	3.45	0.363	0.484
49.6	42.3	32.2	25.0	1.15	30.7	18.6	39.0	2.8	8.44	11.25
88.2	3.64	36.7	2.63	0.58	54.6	1.60	4.11	4.1	0.222	0.296
82.6	10.9	36.8	6.9	1.21	51.7	4.8	10.8	3.9	0.948	1.264
82.0	22.9	39.6	13.7	1.02	50.8	10.1	21.4	3.8	2.68	3.57
77.5	35.4	41.5	22.2	2.3	48.0	15.6	34.7	3.2	9.00	12.00
104	3.64	43.5	2.06	0	64.6	1.60	3.22	4.1	1.187	1.583
103	5.67	43.6	3.44	0.24	63.8	2.49	5.37	3.4	0.373	0.497
101.4	42.7	53.1	24.5	0.45	62.8	18.8	38.24	2.8	7.83	10.44
194	3.28	77.8	3.01	1.65	120	1.44	4.70	3.5	0.274	0.365
198	38.1	91.6	21.5	0	123	16.7	33.56	3.4	5.93	7.91

[a] Temperature of equilibration not given, but probably room temperature (compiler).

[b] Before experiment, i.e. before passing nitrogen through the solution.

[c] 20°C, thermostatically controlled.

[d] Excess over the amount necessary to form $Zn(HSO_3)_2$.

The authors also report some graphs and fitting equations of variation of the SO_2 vapour pressure over the zinc salt solutions studied.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Sodium sulfite; Na_2SO_3; [7757-83-7] 3. Water; H_2O; [7732-18-5]	Murooka, T.; Sato, H. *Bull. Inst. Phys. Chem. Res. (Tokyo)* 1937, *16*, 636-42.
VARIABLES: Two temperatures: 288 and 298 K Concentration of Na_2SO_3	PREPARED BY: B. Engelen, H.D. Lutz

EXPERIMENTAL VALUES:

t/°C	Solvent		Composition of saturated solution				Solid phase
	Na_2SO_3	$NaHSO_3$	$Zn(HSO_3)_2$	$ZnSO_3$	$Zn(HSO_3)_2$[a]	$ZnSO_3$[a]	
	mole/kg soln		g/kg soln		mole/kg soln		
25	0.0		1.460	0.653	0.00642	0.00449	$ZnSO_3.2.5H_2O$
15	0.343[b]					0.0162	"
15	0.641[b]					0.0316	$3ZnSO_3.Na_2SO_3.Zn(OH)_2$?
15	0.499	0.356				0.0641	"
15	0.923	0.346				0.125	"
15	0.977	0.476				0.168	"

[a] Total concentration of dissolved zinc sulfite is $[ZnSO_3] + 2[Zn(HSO_3)_2]$.

[b] Only the sum of Na_2SO_3 and $NaHSO_3$ is given by the authors.

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Saturation method. The water or solution of Na_2SO_3 of known composition was stirred with solid $ZnSO_3.2.5H_2O$ in a thermostatically controlled vessel at the given temperatures until equilibrium was reached (time not given). The solutions were analysed for SO_2 iodometrically, and for HSO_3^- acidimetrically. Mean values of 4 measurements are reported.	$ZnSO_3.2.5H_2O$ was prepared by bubbling SO_2 through a suspension of ZnO in water. After dissolving the ZnO, the sulfite was precipitated by heating.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Zinc sulfite; $ZnSO_3$; [13597-44-9] 2. Zinc sulfate; $ZnSO_4$; [7733-02-0] 3. Sodium sulfite; Na_2SO_3; [7757-83-7] 4. Sodium sulfate; Na_2SO_4; [7757-82-6] 5. Water; H_2O; [7732-18-5]	Margulis, E.V.; Rodin, I.V. *Zh. Neorg. Khim.* 1981, *26*, 2269-70; *Russ. J. Inorg. Chem. (Eng. Transl.)* 1981, *26*, 1221-2.
VARIABLES: Five temperatures: 293 - 368 K Concentration of $ZnSO_4$, Na_2SO_3, and Na_2SO_4	PREPARED BY: H.D. Lutz

EXPERIMENTAL VALUES:

The authors report the solubility of $ZnSO_3.5/2H_2O$ [14460-28-7] in water and in solutions with various amounts of $ZnSO_4$, Na_2SO_3, and Na_2SO_4, at different temperatures.

Pure water

t/°C	$ZnSO_3$ mass %	m($ZnSO_3$)[a] mol kg^{-1}	Zn kg/m^3	c($ZnSO_3$)[a] mol dm^{-3}
20	0.1786	0.01230	1.042	0.01594
50	0.1811	0.01248	1.056	0.01615
70	0.1873	0.01290	1.092	0.01671
85	0.1908	0.01314	1.112	0.01701
95	0.1939	0.01336	1.130	0.01728

[a] Calculated by the compiler.

Remark: The data given by the authors for mass % of $ZnSO_3$ and kg Zn/m^3 seem to be inconsistent.

(continued on next page)

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The experiments were carried out in a water thermostat with mechanical stirring in closed flasks. To convert the concentrations in kg m^{-3} to mass %, the density of the solutions were determined pyknometrically at ambient temperature. It has been assumed that the equilibrium had been reached in the systems when the measured concentrations of Zn^{2+} or SO_3^{2-} remained constant. In all cases, 1 hr was sufficient for equilibration. The solubility of zinc sulfite was determined by analysing the solutions for zinc polarographically, for SO_3^{2-} iodometrically, and for sodium by flame photometry.	Zinc sulfite was precipitated from a solution of zinc sulfate with Na_2SO_3 (1).
	ESTIMATED ERROR: Solubility: $\pm 0.5 \times 10^{-3}$ mass % Temperature: ± 0.5 K (authors).
	REFERENCES: 1. Margulis, E.V.; Grishankina, N.S. *Zh. Neorg. Khim.* 1963, *8*, 2638.

COMPONENTS:

1. Zinc sulfite; $ZnSO_3$; [13597-44-9]
2. Zinc sulfate; $ZnSO_4$; [7733-02-0]
3. Sodium sulfite; Na_2SO_3; [7757-83-7]
4. Sodium sulfate; Na_2SO_4; [7757-82-6]
5. Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Margulis, E.V.; Rodin, I.V.

Zh. Neorg. Khim. 1981, *26*, 2269-70; *Russ. J. Inorg. Chem. (Eng. Transl.)* 1981, *26*, 1221-2.

EXPERIMENTAL VALUES (continued):

t/°C	$ZnSO_4$	$ZnSO_3$	$m(ZnSO_3)$[a]	Na_2SO_3	$ZnSO_3$	$m(ZnSO_3)$[a]	Na_2SO_4	$ZnSO_3$	$m(ZnSO_3)$[a]
	mass %	mass %	mol kg^{-1}	mass %	mass %	mol kg^{-1}	mass %	mass %	mol kg^{-1}
20	1.038	0.182	0.01267	0.006	0.179	0.01233	1.053	0.189	0.01316
	5.11	0.196	0.01423	0.048	0.177	0.01220	4.31	0.210	0.01512
	14.94	0.211	0.01710	0.615	0.173	0.01199	7.21	0.239	0.01776
	25.22	0.222	0.02047	0.890	0.140	0.00973	9.83	0.251	0.01919
	32.14	0.228	0.02318	1.050	0.135	0.00939	14.12	0.264	0.02120
	34.81	0.230	0.02434	1.113	0.132	0.00919	15.45	0.268	0.02186
				3.09	0.239	0.01700			
				6.05	0.369	0.02711			
				12.21	0.653	0.05153			
				20.13	1.241	0.10852			
				21.42	1.249	0.11105			
90	1.221	0.207	0.01444	1.242	0.141	0.00983	1.223	0.206	0.01437
	5.43	0.217	0.01581	3.41	0.176	0.01255	5.11	0.241	0.01751
	15.21	0.232	0.01886	6.21	0.182	0.01337	10.01	0.277	0.02123
	25.03	0.249	0.02291	12.41	0.194	0.01526	19.84	0.287	0.02471
	32.38	0.271	0.02767	20.22	0.207	0.01789	27.32	0.291	0.02764
	37.73	0.276	0.03061	21.42	0.209	0.01834	28.23	0.297	0.02857

Solutions containing Na_2SO_3 and Na_2SO_4 at 20°C.

Na_2SO_3	$ZnSO_3$	$m(ZnSO_3)$[a]	$ZnSO_3$	$m(ZnSO_3)$[a]	$ZnSO_3$	$m(ZnSO_3)$[a]	$ZnSO_3$	$m(ZnSO_3)$[a]
mass %	mass %	mol kg^{-1}	mass %	mol kg^{-1}	mass %	mol kg^{-1}	mass %	mol kg^{-1}
	1.7 % Na_2SO_4[b]		3.4 % Na_2SO_4[b]		4.2 % Na_2SO_4[b]		5.0 % Na_2SO_4[b]	
0.006	0.207	0.01451	0.216	0.01541	0.234	0.01684	0.247	0.01792
0.048	0.201	0.01409	0.205	0.01463	0.209	0.01504	0.224	0.01626
0.615	0.175	0.01234	0.178	0.01277	0.186	0.01346	0.198	0.01445
0.890	0.145	0.01025	0.154	0.01108	0.164	0.01190	0.172	0.01259
1.050	0.139	0.00984	0.151	0.01110	0.160	0.01163	0.169	0.01239

[a] Calculated by the compiler.

[b] Mass %.