COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Ammonium sulfite; $(NH_4)_2SO_3$; [10196-18-5] 2. Water; H_2O; [7732-18-5]	Yasuda, M. *Bull. Inst. Phys. Chem. Research (Tokyo)* <u>1924</u>, *3*, 43-50.
VARIABLES: Temperature: 285 - 333 K	PREPARED BY: Mary R. Masson

EXPERIMENTAL VALUES:

Composition of equilibrium solutions

t/°C	SO_2 mol dm^{-3}	NH_3 mol dm^{-3}	$(NH_4)_2SO_3$ g dm^{-3}	Solid[a] phase
12	3.463	6.899	403.2	B
15	3.675	7.450	426.5	B
20	3.874	7.728	451.5	B
25	4.060	8.092	470.96	A
30	4.189	8.406	485.9	A
40	4.328	8.859	502.4	A
50	4.919	9.641	570.6	A
60	54.64	10.81	633.7	A

[a] Solid phases: A - $2(NH_4)_2SO_3.3H_2O$, B - $(NH_4)_2SO_3.H_2O$

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Equilibrium solutions were analysed by "standard methods" (1).	Not stated.
	ESTIMATED ERROR: No estimates possible.
	REFERENCES: 1. Treadwell, *Analytical Chemistry*, 5th Ed., Vol. II, 560, 692.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Ammonium sulfite; $(NH_4)_2SO_3$; [10196-04-0] 2. Water; H_2O; [7732-18-5]	Ishikawa, F.; Murooka, T. *Bull. Inst. Phys. Chem. Research (Tokyo)* 1928, 7, 1160-76. (In Japanese); *Sci. Repts. Tohoku Imp. University* 1933, 22, 201-219. (In English).
VARIABLES: Temperature: 260 - 373 K	PREPARED BY: Mary R. Masson

EXPERIMENTAL VALUES:

t/°C	Time hr	$(NH_4)_2SO_3$ mass %	$(NH_4)_2SO_3$ mean mass %	$(NH_4)_2SO_3$ g/100 ml soln.	$(NH_4)_2SO_3$[a] mol/kg
0	4.5	32.52			
	5	32.29			
	27	32.46			
	53	32.31	32.40	38.21	4.127
5	4.5	33.75			
	4.5	33.75			
	28	33.79			
		33.87			
		33.89	33.81	40.05	4.398
10	5	35.05			
	30	35.05	35.05	41.69	4.647
15	4.5	36.39			
	5.5	36.40			
	28	36.40			
	51	36.41	36.40	43.47	4.928
20	5	37.78			
	24	37.82	37.80	45.34	5.233
25	24	39.30			
	24	39.28	39.29	47.31	5.572
30	5	40.75			
	16	40.82			
	18	40.73	40.77	49.32	5.927

(continued on next page)

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:

A simple saturation technique was used. An atmosphere of ammonia-satd. nitrogen was used, in an open vessel for temperatures up to 80°C, and in a closed vessel at the higher temps. Solution samples were removed through a filtering tube containing cotton wool into a pipette with stopcocks at both ends. The solution removed was weighed and analysed.
    Sulfur dioxide was determined by reaction of the sample with excess of acidified iodine solution, followed by back-titration with thiosulfate. Ammonia was determined after addition of sodium hydroxide, collection of the evolved ammonia in standard sulfuric acid solution, and titration of the excess of acid with standard sodium hydroxide to a sodium alizarin sulfonate end-point.
    The solubility was calculated from the mean of the values corresponding to these two analyses.

SOURCE AND PURITY OF MATERIALS:

Sulfur dioxide gas from a cylinder was passed into an ammonia solution under an atmosphere of hydrogen, until only a little free ammonia remained. The small crystals obtained were redissolved in the solution by heating, then the solution was cooled very slowly to allow large crystals to separate. These were filtered off under N_2 and kept in a special desiccator.

ESTIMATED ERROR:

Temperature: ±0.02°C (up to 80°C)
                    ±0.05°C (above 80°C)
Analyses: r.s.d. generally < 0.2%.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Ammonium sulfite; $(NH_4)_2SO_3$; [10196-04-0] 2. Water; H_2O; [7732-18-5]	Ishikawa, F.; Murooka, T. *Bull. Inst. Phys. Chem. Research (Tokyo)* <u>1928</u>, 7, 1160-76. (In Japanese); *Sci. Repts. Tohoku Imp. University* <u>1933</u>, 22, 201-219. (In English).

EXPERIMENTAL VALUES (continued):

t/°C	Time hr	$(NH_4)_2SO_3$ mass %	$(NH_4)_2SO_3$ mean mass %	$(NH_4)_2SO_3$ g/100 ml soln.	$(NH_4)_2SO_3$[a] mol/kg
35	5	42.35			
	24	42.31			
	24	42.31	42.32	51.44	6.317
40	5	43.93			
	29	43.98			
	29	43.96	43.96	53.64	6.754
50	2	47.27			
	4	47.25	47.26	58.16	7.716
60	2	50.90			
	4.5	50.97	50.94	63.31	8.940
70	2.5	54.72			
	3	54.70			
	4.5	54.72	54.71	68.70	10.401
75	2	56.51			
	4.5	56.54	56.52	71.38	11.193
80	1.5	58.88			
	1.5	58.90	58.89	74.88	12.334
85[b]	1	59.42			
	2	59.50			
	2.5	59.68	59.53		12.665
90[b]	1.5	60.10			
	3.5	59.90	60.00		12.915
95[b]	1	60.27			
	1.5	60.34	60.30		13.078
100[b]	1	60.63			
	1.5	60.26			
	1.5	60.44	60.44		13.155
- 6.55	2	30.69			
	2	30.55	30.62		3.800
-11.52	2	29.14			
	3	29.19	29.16		3.544
-12.96		28.87			
		28.84	28.85		3.491
- 1.73[c]		4.961			0.449
- 1.82[c]		5.162			0.469
- 3.35[c]		9.698			0.925
- 4.61[c]		13.044			1.292
- 6.27[c]		16.817			1.741
- 7.97[c]		20.505			2.221
- 9.69[c]		23.652			2.667
-12.74[c]		28.418			3.418
-12.96		28.855			3.492

[a] Molalities calculated by the compiler.

[b] Solid phases: $(NH_4)_2SO_3$, [c] solid phase ice, otherwise $(NH_4)_2SO_3 \cdot H_2O$.

The transition temperature between the monohydrate and the anhydrous salt was found to be 80.8± 0.2°C.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Ammonium sulfite; $(NH_4)_2SO_3$; [10196-04-0] 2. Water; H_2O; [7732-18-5]	Vasilenko, N.A. *Zh. Priklad. Khim.* 1950, *23*, 472-81.

VARIABLES:	PREPARED BY:
Temperature: 261 - 303 K	Mary R. Masson

EXPERIMENTAL VALUES:

Composition of equilibrium solutions

t/°C	$(NH_4)_2SO_3$ mass %	$(NH_4)_2SO_3$[a] mol/kg	Solid[b] phase
-12.0	26.9	3.168	A
-10.6	24.7	2.824	A
- 9.2	22.4	2.485	A
- 7.8	20.0	2.153	A
- 6.6	17.3	1.801	A
- 5.3	14.4	1.448	A
- 4.0	11.3	1.097	A
- 2.8	7.9	0.739	A
- 1.5	4.1	0.368	A
- 5.2	30.7	3.814	B
+ 1.2	32.5	4.146	B
7.2	34.1	4.455	B
9.0	34.7	4.575	B
13.2	35.9	4.822	B
19.1	37.7	5.211	B
25.2	39.3	5.575	B
30.3	40.8	5.934	B

[a] Molalities calculated by the compiler.

[b] Solid phases: A - ice, B - $(NH_4)_2SO_3 \cdot H_2O$

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A simple saturation procedure.	
	ESTIMATED ERROR: No estimates possible. -
	REFERENCES: