COMPONENTS:	EVALUATOR:
1. Ammonium pyrosulfite; $(NH_4)_2S_2O_5$; [32736-64-4] 2. Water; H_2O; [7732-18-5]	Mary R. Masson, Dept. of Chemistry, University of Aberdeen, Meston Walk, Old Aberdeen, AB9 2UE, Scotland, UK. March, 1984.

CRITICAL EVALUATION:

The binary system ammonium pyrosulfite - water was studied by Vasilenko (1), and data are also available from studies of ternary systems (1 - 3). The solubilities are reported in terms of mass % of ammonium hydrogen sulfite, rather than of ammonium pyrosulfite.

Apart from one or two points, which were rejected, the data are in reasonable agreement. There are two regression equations. The first applies to the equilibrium with ice as solid phase (at 243 - 273 K).

$$(T - 273.15) = 0.101 - 0.412y + 0.00344y^2 - 0.0000865y^3 \qquad s = 0.193 \text{ (15 pts)}$$

or

$$y = -0.240 - 3.01(T - 273.2) - 0.0350(T - 273.2)^2 \qquad s = 0.360 \text{ (15 pts)}$$

and the second to the equilibrium with solid $(NH_4)_2S_2O_5$ (at 243 - 333 K)

$$y = 72.07 + 0.2825(T - 273.2) - 0.002423(T - 273.2)^2 + 0.00001996(T - 273.2)^3$$
$$s = 0.376 \text{ (33 pts)}$$

where $y = 100w$ is the solubility in mass % of NH_4HSO_3, T is the temperature in K, and s is the estimated standard deviation of the dependent variable about the regression line.

TENTATIVE SOLUBILITIES

The following tentative solubility values for $(NH_4)_2S_2O_5$ in water were calculated from the second regression equation.

T/K	Solubility		
	mass % of NH_4HSO_3	mass % of $(NH_4)_2S_2O_5$	molality of $(NH_4)_2S_2O_5$ mol/kg
253.2	65.5	59.5	8.15
263.2	69.0	62.7	9.33
273.2	72.1	65.5	10.5
283.2	74.7	67.9	11.7
293.2	76.8	69.8	12.8
303.2	78.4	71.3	13.8
313.2	79.5	72.3	14.5
323.2	80.2	72.9	14.9
333.2	80.4	73.1	15.1

Ammonium pyrosulfite - ammonium sulfate - water. The two sets of data for this system, measured by Vasilenko (1) and Terres and Heinsen (2), are not in very good agreement, although the trends are similar. In the absence of any other evidence, I am inclined to favour the data of Vasilenko, because his other work appears to be more reliable than that of Terres and co-workers. It should be noted that the solution analyses for this system are expressed in terms of ammonium hydrogen sulfite rather than ammonium pyrosulfite.

COMPONENTS:	EVALUATOR:
1. Ammonium pyrosulfite; $(NH_4)_2S_2O_5$; [32736-64-4] 2. Water; H_2O; [7732-18-5]	Mary R. Masson, Dept. of Chemistry, University of Aberdeen, Meston Walk, Old Aberdeen, AB9 2UE, Scotland, UK. March, 1984.

CRITICAL EVALUATION: (continued)

REFERENCES

1. Vasilenko, N.A. *Zh. Priklad. Khim.* <u>1948</u>, *21*, 917.

2. Vasilenko, N.A. *Zh. Priklad. Khim.* <u>1949</u>, 22, 338.

3. Terres, E.; Heinsen, A. *Das Gas- und Wasserfach* <u>1927</u>, *70*, 1157.

Temperature, deg C

$\langle T/K - 273.15 \rangle$