COMPONENTS:	EVALUATOR:
(1) Tripotassium phosphate; K_3PO_4; [7778-53-2] (2) Water; H_2O; [7732-18-5]	J. Eysseltová Charles University Prague, Czechoslovakia May 1985

CRITICAL EVALUATION:

THE BINARY SYSTEM

The situation with this system is similar to that for the K_2HPO_4-H_2O system. There are insufficient data to use the solubility equation described in the section on NaH_2PO_4 (chap. 3). Solubility measurements were made by Ravich (1). However, there are only a few additional data: four experimental values in ref (2), two in ref (3), and one in each of two other papers (4,5). All these other values are 1-10% lower than those of Ravich (1). Therefore, no values can be recommended for the solubility of tripotassium phosphate in water.

There is also uncertainty with respect to the degree of hydration of the tripotassium phosphate. Ravich (1) reported the existence of a stable heptahydrate and trihydrate and a metastable enneahydrate. However, it is possible that there is some error in his assignment of stability and metastability to the eutonic solutions. Some authors (2,6) also report the existence of an octahydrate as the stable phase at room temperature, but neither Ravich (7,8) nor Berg (9-11) observed an octahydrate in their detailed studies of the K_2O-P_2O_5-H_2O system. Therefore, the evaluator concludes that the existence of the octahydrate has not been established.

MULTICOMPONENT SYSTEMS

Several ternary and one quaternary systems have been studied but there are insufficient solubility values to enable any to be recommended.

1. The K_3PO_4-NH_3-H_2O system. A miscibility gap was found in this system (2).

2. The K_3PO_4-KBO_2-H_2O system. Solubility measurements were made for this system at 298 K (6). The method of analysis for phosphate used in this study was incorrect, giving values that were in error by +30-80%.

3. The K_3PO_4-K_2SO_4-H_2O system. This system was studied at 343 K (4) and the existence of the compound $K_2SO_4 \cdot K_3PO_4 \cdot 9H_2O$ was reported.

4. The K_3PO_4-KNO_2-H_2O system. Solubility values were measured at 298 K (5). Neither new compounds, e.g., $K_3PO_4 \cdot KNO_2$, nor solid solutions are present in this system.

5. The K_3PO_4-K_2SO_4-KVO_3-H_2O system. A study was made of this system at 308 and 333 K (3). In addition to the components and their hydrates, the following were reported as equilibrium solid phases:

   (i) $4K_2O \cdot P_2O_5 \cdot V_2O_5 \cdot 30H_2O$; (ii) $4K_2O \cdot P_2O_5 \cdot V_2O_5 \cdot 24H_2O$;

   (iii) $4K_2O \cdot P_2O_5 \cdot V_2O_5 \cdot 22H_2O$; (iv) $4K_2O \cdot P_2O_5 \cdot V_2O_5 \cdot 18H_2O$;

   (v) $5K_2O \cdot P_2O_5 \cdot 2SO_3 \cdot 30H_2O$; and (vi) $5K_2O \cdot P_2O_5 \cdot 2SO_3 \cdot 22H_2O$. The ratio K:P:S for (v) and

   (vi) is the same as that reported by others (4).

References

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