

COMPONENTS:							ORIGINAL MEASUREMENTS:																																																																																																																																																																																																								
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]							Abduragimova, R.A.; Rza-Zade, P.F.; Abduragimov, A.A.																																																																																																																																																																																																								
(2) Sodium aluminate; NaAlO_2 ; [1302-42-7]							<i>Dokl. Akad. Nauk Azerb. SSR</i> <u>1971</u> , 27, 41-5.																																																																																																																																																																																																								
(3) Sodium hydroxide; NaOH ; [1310-73-2]																																																																																																																																																																																																															
(4) Disodium sulfate; Na_2SO_4 ; [7757-82-6]																																																																																																																																																																																																															
(5) Water; H_2O ; [7732-18-5]																																																																																																																																																																																																															
VARIABLES:							PREPARED BY:																																																																																																																																																																																																								
Composition at 25°C and one ratio of $\text{NaAlO}_2/\text{NaOH} = 1$.							J. Eysseltová																																																																																																																																																																																																								
EXPERIMENTAL VALUES:																																																																																																																																																																																																															
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">$\text{NaAlO}_2 + \text{NaOH}$</th> <th></th> <th style="text-align: left;">Na_2SO_4</th> <th></th> <th style="text-align: left;">Na_3PO_4</th> <th></th> <th style="text-align: left;">H_2O</th> <th></th> <th style="text-align: left;">solid phase^a</th> </tr> <tr> <th>mass%</th> <th>mol/kg^b</th> <th>mass%</th> <th>mol/kg^b</th> <th>mass%</th> <th>mol/kg^b</th> <th>mass%</th> <th>mass%^b</th> <th></th> </tr> </thead> <tbody> <tr><td>----</td><td>----</td><td>21.90</td><td>1.97</td><td>----</td><td>----</td><td>78.10</td><td></td><td>A</td></tr> <tr><td>----</td><td>----</td><td>----</td><td>----</td><td>12.30</td><td>0.85</td><td>87.70</td><td></td><td>B</td></tr> <tr><td>21.15</td><td>2.43</td><td>7.46</td><td>0.74</td><td>----</td><td>----</td><td>71.39</td><td></td><td>A + C</td></tr> <tr><td>----</td><td>----</td><td>20.75</td><td>1.89</td><td>2.10</td><td>0.16</td><td>77.15</td><td></td><td>B + D</td></tr> <tr><td>50.13</td><td>8.29</td><td>0.29</td><td>0.04</td><td>----</td><td>----</td><td>49.58</td><td></td><td>C</td></tr> <tr><td>47.72</td><td>7.54</td><td>0.39</td><td>0.05</td><td>----</td><td>----</td><td>51.89</td><td></td><td>"</td></tr> <tr><td>46.48</td><td>7.15</td><td>----</td><td>----</td><td>0.25</td><td>0.03</td><td>53.27</td><td></td><td>E</td></tr> <tr><td>42.11</td><td>6.00</td><td>----</td><td>----</td><td>0.36</td><td>0.04</td><td>57.53</td><td></td><td>"</td></tr> <tr><td>----</td><td>----</td><td>19.41</td><td>1.73</td><td>1.78</td><td>0.14</td><td>78.81</td><td></td><td>B</td></tr> <tr><td>----</td><td>----</td><td>16.01</td><td>1.37</td><td>1.79</td><td>0.13</td><td>82.20</td><td></td><td>"</td></tr> <tr><td>----</td><td>----</td><td>8.29</td><td>0.67</td><td>4.42</td><td>0.31</td><td>87.29</td><td></td><td>"</td></tr> <tr><td>----</td><td>----</td><td>1.51</td><td>0.12</td><td>11.22</td><td>0.78</td><td>87.27</td><td></td><td>"</td></tr> <tr><td>1.85</td><td>0.18</td><td>12.34</td><td>1.02</td><td>0.81</td><td>0.06</td><td>85.00</td><td></td><td>A + B + F</td></tr> <tr><td>32.16</td><td>3.96</td><td>0.92</td><td>0.10</td><td>0.38</td><td>0.03</td><td>66.54</td><td></td><td>C + E + F</td></tr> <tr><td>0.74</td><td>0.07</td><td>0.39</td><td>0.03</td><td>7.86</td><td>0.52</td><td>91.01</td><td></td><td>B + F</td></tr> <tr><td>28.34</td><td>3.33</td><td>1.65</td><td>0.17</td><td>0.28</td><td>0.02</td><td>69.73</td><td></td><td>A + C + F</td></tr> <tr><td>26.23</td><td>2.98</td><td>1.28</td><td>0.12</td><td>0.30</td><td>0.02</td><td>72.19</td><td></td><td>B + E + F</td></tr> <tr><td>46.00</td><td>7.08</td><td>0.44</td><td>0.06</td><td>0.26</td><td>0.03</td><td>53.30</td><td></td><td>E + C</td></tr> <tr><td>42.62</td><td>6.20</td><td>0.63</td><td>0.08</td><td>0.43</td><td>0.05</td><td>56.32</td><td></td><td>"</td></tr> <tr><td>37.92</td><td>5.14</td><td>1.01</td><td>0.12</td><td>0.55</td><td>0.06</td><td>60.52</td><td></td><td>"</td></tr> </tbody> </table>										$\text{NaAlO}_2 + \text{NaOH}$		Na_2SO_4		Na_3PO_4		H_2O		solid phase ^a	mass%	mol/kg ^b	mass%	mol/kg ^b	mass%	mol/kg ^b	mass%	mass% ^b		----	----	21.90	1.97	----	----	78.10		A	----	----	----	----	12.30	0.85	87.70		B	21.15	2.43	7.46	0.74	----	----	71.39		A + C	----	----	20.75	1.89	2.10	0.16	77.15		B + D	50.13	8.29	0.29	0.04	----	----	49.58		C	47.72	7.54	0.39	0.05	----	----	51.89		"	46.48	7.15	----	----	0.25	0.03	53.27		E	42.11	6.00	----	----	0.36	0.04	57.53		"	----	----	19.41	1.73	1.78	0.14	78.81		B	----	----	16.01	1.37	1.79	0.13	82.20		"	----	----	8.29	0.67	4.42	0.31	87.29		"	----	----	1.51	0.12	11.22	0.78	87.27		"	1.85	0.18	12.34	1.02	0.81	0.06	85.00		A + B + F	32.16	3.96	0.92	0.10	0.38	0.03	66.54		C + E + F	0.74	0.07	0.39	0.03	7.86	0.52	91.01		B + F	28.34	3.33	1.65	0.17	0.28	0.02	69.73		A + C + F	26.23	2.98	1.28	0.12	0.30	0.02	72.19		B + E + F	46.00	7.08	0.44	0.06	0.26	0.03	53.30		E + C	42.62	6.20	0.63	0.08	0.43	0.05	56.32		"	37.92	5.14	1.01	0.12	0.55	0.06	60.52		"
$\text{NaAlO}_2 + \text{NaOH}$		Na_2SO_4		Na_3PO_4		H_2O		solid phase ^a																																																																																																																																																																																																							
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METHOD/APPARATUS/PROCEDURE:					SOURCE AND PURITY OF MATERIALS:																																																																																																																																																																																																										
The isothermal method was used with metallic vessels having a mechanical stirrer. The time for equilibration was 155 hours. Saturated solutions were sampled by filtration and analyzed for Na_2O , Al_2O_3 , and P_2O_5 by volumetric, gravimetric, photocolorimetric and nephelometric methods. The composition of the solid phases was determined by Schreinemakers' method.					No details are given.																																																																																																																																																																																																										
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COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]		Abduragimova, R.A.; Rza-Zade, P.F.; Abduragimov, A.A.	
(2) Sodium aluminate; NaAlO_2 ; [1302-42-7]		<i>Dokl. Akad. Nauk Azerb. SSR</i> <u>1971</u> , 27, 41-5.	
(3) Sodium hydroxide; NaOH ; [1310-73-2]			
(4) Disodium sulfate; Na_2SO_4 ; [7757-82-6]			
(5) Water, H_2O ; [7732-18-5]			

EXPERIMENTAL VALUES cont'd:

Composition of saturated solutions in the
 $\text{NaAlO}_2\text{-NaOH-Na}_2\text{SO}_4\text{-Na}_3\text{PO}_4\text{-H}_2\text{O}$ system at 25°C.

$\text{NaAlO}_2 + \text{NaOH}$		Na_2SO_4		Na_3PO_4		H_2O	solid phase ^a
mass%	mol/kg ^b	mass%	mol/kg ^b	mass%	mol/kg ^b	mass% ^b	
30.23	3.64	1.31	0.14	0.46	0.04	68.00	E + C
28.42	3.35	1.61	0.16	0.39	0.03	69.58	"
28.00	3.27	1.45	0.14	0.28	0.02	70.27	A + F
22.94	2.54	2.81	0.27	0.29	0.02	73.96	"
26.07	2.97	1.36	0.13	0.54	0.04	72.03	B + E + F
26.10	2.95	1.21	0.12	0.19	0.02	72.50	"
22.00	2.38	1.61	0.15	0.64	0.05	75.75	B + F
18.06	1.84	1.09	0.10	0.58	0.04	80.27	"
2.42	0.20	0.01	0.00	0.81	0.05	96.76	"
0.65	0.06	2.46	0.18	2.06	0.13	94.83	"

^aThe solid phases are: A = $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$; B = $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$; C = $\text{Al}_2\text{O}_3 \cdot 3\text{Na}_2\text{O} \cdot 7.5\text{H}_2\text{O}$; D = $\text{Al}_2(\text{SO}_4)_3 \cdot 10\text{H}_2\text{O}$; E = $\text{Al}_2\text{O}_3 \cdot 2.5\text{Na}_2\text{O} \cdot 14\text{H}_2\text{O}$; F = $3\text{Al}_2\text{O}_3 \cdot 4\text{Na}_2\text{O} \cdot \text{P}_2\text{O}_5 \cdot 15\text{H}_2\text{O}$.

It should be noted that the "solid phase" column in the source paper contains a great number of typographic errors.

^bThe mol/kg H_2O values were calculated by the compiler.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9] (2) Sodium vanadate; NaVO_3 ; [13718-23-8] (3) Disodium sulfate; Na_2SO_4 ; [7757-82-6] (4) Water; H_2O , [7732-18-5]	Abduragimova, R.A.; Rza-Zade, P.F. Issled. Obl. Neorg. Fiz. Khim. 1971, 191-5.

VARIABLES: Composition at 25°C.	PREPARED BY: J. Eysseltova
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EXPERIMENTAL VALUES:Composition of saturated solutions in the Na_3PO_4 - NaVO_3 - Na_2SO_4 - H_2O system at 25°C.

Na_3PO_4 mass% ^a	Na_3PO_4 mol/kg ^b	NaVO_3 mass% ^a	NaVO_3 mol/kg ^b	Na_2SO_4 mass% ^a	Na_2SO_4 mol/kg ^b	solid phase ^c
12.30	0.85	----	----	----	----	A
----	----	17.40	1.73	----	----	B
----	----	----	----	21.90	1.97	C
0.92	0.07	14.40	1.41	0.88	0.07	B + D
1.98	0.15	11.80	1.17	3.70	0.32	"
2.6	0.19	9.80	0.99	6.15	0.53	"
2.20	0.16	6.42	0.64	8.82	0.75	B + D + E
1.60	0.12	3.65	0.36	12.60	1.08	B + E
1.06	0.08	1.98	0.20	15.09	1.30	"
0.95	0.07	1.52	0.16	18.39	1.64	"
0.83	0.06	1.31	0.14	20.42	1.86	B + C + E
5.21	0.39	12.65	1.26	----	----	A + E
4.35	0.31	8.20	0.78	1.20	0.10	A + D
4.02	0.28	6.42	0.60	2.60	0.21	"
3.45	0.24	4.25	0.39	3.45	0.27	"
3.01	0.20	2.68	0.24	3.13	0.24	"
2.43	0.17	1.46	0.14	8.80	0.71	A + D + E
2.03	0.14	0.87	0.08	9.60	0.77	A + E
1.79	0.12	0.80	0.08	10.40	0.84	"
1.62	0.12	0.63	0.06	13.15	1.09	"
1.59	0.12	0.45	0.04	15.80	1.35	"
1.12	0.09	0.21	0.02	20.60	1.86	A + C + E

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The method of the third component was used. Equilibrium was checked by analysis. The alkali metal content was determined by using 0.5 mol dm ⁻³ HCl. Sulfate was determined gravimetrically as BaSO_4 . P and V were determined photocalorimetrically.	All the salts were of chemically pure grade and were recrystallized before being used.
	ESTIMATED ERROR: No information is given.
	REFERENCES:

Trisodium Phosphate

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]	Abduragimova, R.A.; Rza-Zade, P.F.
(2) Sodium vanadate; NaVO_3 ; [13718-23-8]	Issled. Obl. Neorg. Fiz. Khim. 1971, 191-5.
(3) Disodium sulfate; Na_2SO_4 ; [7757-82-6]	
(4) Water; H_2O ; [7732-18-5]	

EXPERIMENTAL VALUES Cont'd:

Composition of saturated solutions in the Na_3PO_4 - NaVO_3 - Na_2SO_4 - H_2O system at 25°C.

Na_3PO_4		NaVO_3		Na_2SO_4		
mass% ^a	mol/kg ^b	mass% ^a	mol/kg ^b	mass% ^a	mol/kg ^b	solid phase ^c
1.25	0.09	16.82	1.68	----	----	B + D
2.18	0.16	5.12	0.50	8.16	0.68	D + E
1.87	0.13	3.81	0.36	6.82	0.55	"
1.63	0.11	3.16	0.29	6.23	0.49	"
----	----	1.58	0.17	20.80	1.89	B + C
2.10	0.16	----	----	20.78	1.90	A + C
1.40	0.09	4.01	0.36	2.29	0.17	B
1.80	0.13	11.98	1.19	3.89	0.33	"
2.03	0.15	10.18	1.02	5.76	0.49	"
2.97	0.23	9.73	1.01	8.03	0.71	"
1.93	0.14	7.22	0.72	8.65	0.74	"
1.73	0.13	5.67	0.58	12.63	1.11	"
1.40	0.11	3.40	0.35	16.12	1.44	D
1.98	0.14	13.94	1.38	1.33	0.11	"
2.93	0.22	12.88	1.28	1.74	0.15	"
3.55	0.25	8.65	0.83	2.45	0.20	"
3.82	0.27	8.13	0.78	2.03	0.17	"
3.09	0.22	7.33	0.69	2.78	0.22	"
2.13	0.15	6.12	0.59	6.83	0.57	"
2.67	0.19	4.68	0.45	6.91	0.58	"
1.2	0.08	4.13	0.39	8.2	0.67	E
1.94	0.14	3.92	0.37	7.99	0.65	"
2.06	0.15	3.11	0.30	9.01	0.74	"
2.09	0.15	2.89	0.28	10.14	0.84	"
1.92	0.16	2.43	0.27	12.38	0.94	"
1.88	0.14	1.63	0.17	16.47	1.45	"
1.21	0.09	1.13	0.12	18.32	1.62	"
2.63	0.17	2.48	0.22	1.34	0.10	A
3.36	0.22	2.13	0.19	1.43	0.11	"
4.48	0.30	1.77	0.16	1.60	0.12	"
2.88	0.19	1.18	0.10	1.80	0.14	"
4.69	0.31	0.96	0.08	2.05	0.16	"
5.13	0.34	0.76	0.07	2.28	0.17	"
5.49	0.37	0.63	0.06	2.90	0.22	"
6.35	0.43	0.43	0.04	3.19	0.25	"
8.42	0.58	0.21	0.02	3.28	0.26	"
9.80	0.69	0.22	0.02	3.32	0.27	"

^a The compiler supposes this column to have this meaning. In the source paper nothing is specified.^b These values were calculated by the compiler on the assumption stated in footnote ^a.^c The solid phases are: A = $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$; B = $\text{NaVO}_3 \cdot 2\text{H}_2\text{O}$; C = $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$; D = $4\text{Na}_2\text{O} \cdot \text{P}_2\text{O}_5 \cdot \text{V}_2\text{O}_5 \cdot 30\text{H}_2\text{O}$; E = $4\text{Na}_2\text{O} \cdot \text{P}_2\text{O}_5 \cdot \text{V}_2\text{O}_5 \cdot 18\text{H}_2\text{O}$.

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]				Manvelyan, M.G.; Galstyan, V.D.; Sayamyan, E.A.; Gyunashyan, A.P.; Oganesyan, E.B.			
(2) Disodium silicate; Na_2SiO_3 ; [6834-92-0]				Azn. Khim. Zh. <u>1973</u> , 26, 632-7.			
(3) Dipotassium silicate, K_2SiO_3 ; [10006-28-7]							
(4) Tripotassium phosphate; K_3PO_4 ; [7778-53-2]							
(5) Water; H_2O ; [7732-18-5]							
VARIABLES:		PREPARED BY:					
Composition at 20°C.		J. Eysseltová					
EXPERIMENTAL VALUES:							
Jänecke coordinates of the solutions coexisting with two or more solid phases in the system: $\text{Na}^+ \parallel \text{SiO}_3^{2-}, \text{PO}_4^{3-} - \text{H}_2\text{O}$ at 20°C.							
filtrate				solid phases ^a			
Na^+							
K^+							
SiO_3^{2-}							
PO_4^{3-}							
100.0		75.45	24.55	A + F			
100.0		89.57	10.43	B + F			
74.25	25.75	93.56	6.44	B + C + F			
62.28	37.72	73.30	27.70	A + C + F			
36.46	63.54	22.38	77.62	A + C + E			
15.00	85.00	40.20	59.20	C + D + E			
41.40	58.60	-	100.0	A + E			
13.08	86.92	-	100.0	D + E			
93.80	6.05	95.02	4.82	A + B			
89.42	10.50	95.42	4.59	A + B			
37.88	62.12	31.08	68.90	A + C			
6.55	93.45	55.00	45.00	D			
^a The solid phases are: A = $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$; B = $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$; C = $\text{Na}_3\text{PO}_4 \cdot 8\text{H}_2\text{O}$; D = $\text{K}_3\text{PO}_4 \cdot 7\text{H}_2\text{O}$; E = solid solutions formed by A and D; F = simultaneous crystallization of A and B.							
AUXILIARY INFORMATION							
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:					
The only information given is that the method of invariant points was used.		No information is given.					
		ESTIMATED ERROR:					
		No information is given.					
		REFERENCES:					

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]	Nirenberg, Z.; Solenichyk, B.; Yaron, I.
(2) 2-Propanone (acetone); $\text{C}_3\text{H}_6\text{O}$; [67-64-1]	<i>J. Chem. Eng. Data</i> 1977, 22, 47-8.
(3) Water; H_2O , [7732-18-5]	
VARIABLES:	PREPARED BY:
Composition and temperature.	J. Eysseltová

EXPERIMENTAL VALUES:

I. Ternary solid-liquid equilibrium in the $\text{Na}_3\text{PO}_4-\text{C}_3\text{H}_6\text{O}-\text{H}_2\text{O}$ system.

	Na_3PO_4	$\text{C}_3\text{H}_6\text{O}$	H_2O		Na_3PO_4	$\text{C}_3\text{H}_6\text{O}$	H_2O
t/°C	mass%	mass%	mass%	t/°C	mass%	mass%	mass%
10	4.65	----	95.35	20	7.73	----	92.27
10	2.43	8.10	89.47	20	3.20	7.98	88.82
10	1.06	15.75	83.19	20	1.30	16.75	81.95
10	0.50	24.10	75.40	20	0.75	26.40	72.85
10	0.20	33.30	66.50	20	0.17	32.46	67.37
31.5	10.74	----	89.26	40	15.10	----	84.90
31.5	6.00	6.57	87.43	40	8.80	5.95	85.25
31.5	3.00	13.70	83.30	40	4.90	14.10	81.00
31.5	0.62	24.87	74.50	40	2.25	23.50	74.25
31.5	0.34	34.40	65.06	40	0.90	34.10	65.00
31.5	0.19	42.60	57.20	40	0.27	44.50	55.23
31.5	0.07	52.00	47.93	40	0.09	52.00	47.91

X-ray diffraction showed that the solid phase was $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ and remained unaltered.

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
<p>Acetone-water mixtures were placed in flasks in a thermostat. In experiments at 31.5°C the phosphate was progressively added to the solvent until saturation was reached. When acetone/water ratios exceeded 2/3, a 9% water solution of $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ was added in aliquots of 0.5 ml. At other temperatures an excess of phosphate was always added. Mixtures were equilibrated for 24 hours. Samples were taken, diluted immediately and analyzed for</p>	<p>Analytical reagent grade materials were used and the purity was rechecked. Doubly distilled water was used in all experiments.</p>
	<p>ESTIMATED ERROR: Temperature was controlled to within ± 0.1 K P_2O_5: accuracy ± 0.25 ppm at 50 ppm; acetone: accuracy ± 0.048 mg; Na: accuracy ± 2 ppm at 200 ppm.</p>
	<p>REFERENCES:</p>

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Trisodium phosphate; Na_3PO_4 ; [7601-54-9]	Nirenberg, Z.; Solenchyk, B.; Yaron, I.
(2) 2-Propanone (acetone); $\text{C}_3\text{H}_6\text{O}$; [67-64-1]	J. Chem. Eng. Data <u>1977</u> , 22, 47-8.
(3) Water; H_2O ; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

II. Solubility isotherms in the $\text{Na}_3\text{PO}_4-\text{C}_3\text{H}_6\text{O}-\text{H}_2\text{O}$ system in various ratios of acetone to 100 ml of solution.

ml/100ml	10°C		20°C		31.5°C	
	Na_3PO_4 g/100 ml	sp.gr.	Na_3PO_4 g/100 ml	sp. gr.	Na_3PO_4 g./100 ml	sp. gr.
0	4.86	1.04	8.35	1.08	11.50	1.07
10	2.37	0.98	3.30	1.02	6.39	1.05
20	1.05	0.98	1.25	0.98	3.02	1.00
30	0.47	0.97	0.72	0.95	0.61	0.96
40	0.19	0.95	0.16	0.94	0.32	0.93
50	trace	----	trace	----	0.18	0.90
60	0	----	0	----	0.07	0.90
100	0	----	0	----	0	----
40°C						
0	17.05	1.13				
10	9.67	1.10				
20	5.11	1.04				
30	2.25	1.00				
40	0.87	0.97				
50	0.26	0.94				
60	0.08	0.91				
100	0	----				

COMPONENTS:	EVALUATOR:																								
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Potassium hydroxide; KOH; [1310-58-3] (4) Water; H ₂ O; [7732-18-5]	J. Eyseltová Charles University Prague, Czechoslovakia July, 1986																								
CRITICAL EVALUATION:																									
The K ₂ O-P ₂ O ₅ -H ₂ O system																									
<p>The K₂O-P₂O₅-H₂O system has been the subject of study in fifteen papers (1-15). Some of these (1-8) report the solubility over a wide range of K/P ratios; others (9-15) limit the study to a narrow range of K/P ratios. In the latter papers the study is often limited to the solubility of compounds such as KH₂PO₄ or KH₅(PO₄)₂.</p> <p>Figures 1-3 illustrate the difficulties encountered in attempting to determine solubilities in this system. One of the characteristics of this system is its tendency to form supersaturated solutions. This fact has been stressed by those who have made the most comprehensive studies (3-7) and is especially characteristic at K/P ratios ≥ 2. In such solutions the reported solubilities vary widely.</p> <p>Only two conclusions can be deduced from a comparison of solubility studies made on this system.</p> <ol style="list-style-type: none"> 1. The determination of the solubility of all potassium phosphates except KH₂PO₄ and KH₅(PO₄)₂ is extremely difficult and considerable care must be given to the conditions under which the determinations are made. 2. Most of the results reported by Jänecke (2) have a systematic error and should be rejected. <p>Because of the complexity of the system, a large number of equilibrium solid phases have been reported. They are listed below.</p> <table> <tbody> <tr> <td>K₃PO₄·7H₂O</td> <td>[22763-02-6]</td> <td>3K₂HPO₄·KH₂PO₄·2H₂O</td> <td>[101056-48-8]</td> </tr> <tr> <td>K₃PO₄·3H₂O</td> <td>[22763-03-7]</td> <td>K₅H₄(PO₄)₃·H₂O</td> <td>[101056-49-9]</td> </tr> <tr> <td>K₃PO₄</td> <td>[7778-53-2]</td> <td>K₂HPO₄·KH₂PO₄·3H₂O</td> <td>[101056-50-2]</td> </tr> <tr> <td>K₂HPO₄·6H₂O</td> <td>[101056-47-7]</td> <td>K₂HPO₄·KH₂PO₄·2H₂O</td> <td>[66922-99-4]</td> </tr> <tr> <td>K₂HPO₄·3H₂O</td> <td>[16788-57-1]</td> <td>KH₂PO₄</td> <td>[7778-77-0]</td> </tr> <tr> <td>K₂HPO₄</td> <td>[7758-11-4]</td> <td>KH₅(PO₄)₂</td> <td>[14887-42-4]</td> </tr> </tbody> </table> <p>The conditions under which these hydrates exist and their transition points are discussed in the Critical Evaluation of the binary systems.</p> <p>The incongruently soluble KH₅(PO₄)₂ has been observed in all studies which investigated strongly acid solutions (1,3-7,9) and its existence may be taken as proved. A study of the temperature dependence of the solubility of this compound (13) has proved that it is incongruently soluble up to 373 K.</p> <p>K/P ratios between 1 and 2. Some compound may also exist in the region between KH₂PO₄ and K₂HPO₄ but the solubility results that have been reported (1,3-9) differ substantially. Parker (1) did not observe K₂HPO₄ and his solid phase formulations in this region are probably incorrect. Berg (3,4) reports the presence of K₂HPO₄·KH₂PO₄·3H₂O at 298 K in a very limited concentration interval: 35.53 to 34.48% K₂O and 29.09 to 29.39% P₂O₅, i.e., 53.40 to 52.85% K₃PO₄ and 15.54 to 15.69% H₃PO₄. Flatt, et al. (9) reported the presence of K₅H₄(PO₄)₃·H₂O or 2K₂HPO₄·KH₂PO₄·H₂O at 298 K in the concentration range 51.5 to 52.4% K₃PO₄ and 16.3 to 15.7% H₃PO₄. This compound was also reported by Staudenmayer (16).</p> <p>A careful study of the transition between KH₂PO₄ and K₂HPO₄ at 298 K has been made (8). The existence of the above reported complexes was not observed, nor was the presence of K₂HPO₄·3H₂O. These authors suggest that the crystallization of K₂HPO₄ and KH₂PO₄ occurs somewhere between 20.5 to 31.3% K₃PO₄ and 13.7 to 14.8% H₃PO₄, i.e., at a significantly lower K₃PO₄ content.</p> <p>Ravich (6,7) studied the system at 273 K and reports no solid phase with a K/P ratio between 1 and 2. Berg (5) reported the presence of K₂HPO₄·KH₂PO₄·2H₂O and 3K₂HPO₄·KH₂PO₄·2H₂O at 323 K. The latter compound was also observed by Staudenmayer (16). However, Berg (5) was not certain of the identity of these compounds.</p> <p>In conclusion, the Evaluator believes that no decision about the existence of the solid phases in the K₂O-P₂O₅-H₂O system can be made until further studies are reported. In making such investigations the existence of very viscous solutions will be encountered. These solutions become supersaturated very readily. Meanwhile, the data of Berg (3-5) and Ravich (6,7) are to be considered as tentative values.</p> <p>The solubility curves for KH₂PO₄ (1,3-14) agree satisfactorily. Punin's smoothing equation (15) may be useful for temperature extrapolation, but its use for the binary KH₂PO₄-H₂O system shows a systematic error of about +10% when compared with accepted experimental values.</p>		K ₃ PO ₄ ·7H ₂ O	[22763-02-6]	3K ₂ HPO ₄ ·KH ₂ PO ₄ ·2H ₂ O	[101056-48-8]	K ₃ PO ₄ ·3H ₂ O	[22763-03-7]	K ₅ H ₄ (PO ₄) ₃ ·H ₂ O	[101056-49-9]	K ₃ PO ₄	[7778-53-2]	K ₂ HPO ₄ ·KH ₂ PO ₄ ·3H ₂ O	[101056-50-2]	K ₂ HPO ₄ ·6H ₂ O	[101056-47-7]	K ₂ HPO ₄ ·KH ₂ PO ₄ ·2H ₂ O	[66922-99-4]	K ₂ HPO ₄ ·3H ₂ O	[16788-57-1]	KH ₂ PO ₄	[7778-77-0]	K ₂ HPO ₄	[7758-11-4]	KH ₅ (PO ₄) ₂	[14887-42-4]
K ₃ PO ₄ ·7H ₂ O	[22763-02-6]	3K ₂ HPO ₄ ·KH ₂ PO ₄ ·2H ₂ O	[101056-48-8]																						
K ₃ PO ₄ ·3H ₂ O	[22763-03-7]	K ₅ H ₄ (PO ₄) ₃ ·H ₂ O	[101056-49-9]																						
K ₃ PO ₄	[7778-53-2]	K ₂ HPO ₄ ·KH ₂ PO ₄ ·3H ₂ O	[101056-50-2]																						
K ₂ HPO ₄ ·6H ₂ O	[101056-47-7]	K ₂ HPO ₄ ·KH ₂ PO ₄ ·2H ₂ O	[66922-99-4]																						
K ₂ HPO ₄ ·3H ₂ O	[16788-57-1]	KH ₂ PO ₄	[7778-77-0]																						
K ₂ HPO ₄	[7758-11-4]	KH ₅ (PO ₄) ₂	[14887-42-4]																						

(continued next page)

COMPONENTS:

- (1) Tripotassium phosphate; K₃PO₄; [7778-53-2]
 (2) Phosphoric acid; H₃PO₄; [7664-38-2]
 (3) Potassium hydroxide; KOH; [1310-58-3]
 (4) Water; H₂O; [7732-18-5]

EVALUATOR:

J. Eysseľtová
 Charles University
 Prague, Czechoslovakia
 July, 1986

CRITICAL EVALUATION:

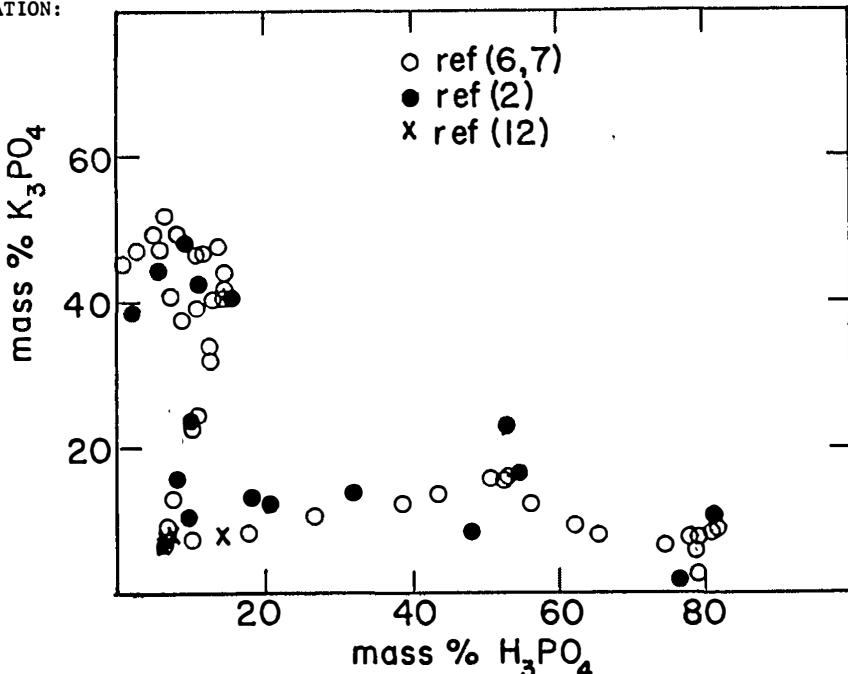


Figure 1. Solubility in the K₃PO₄-H₃PO₄-KOH-H₂O system at 273 K.

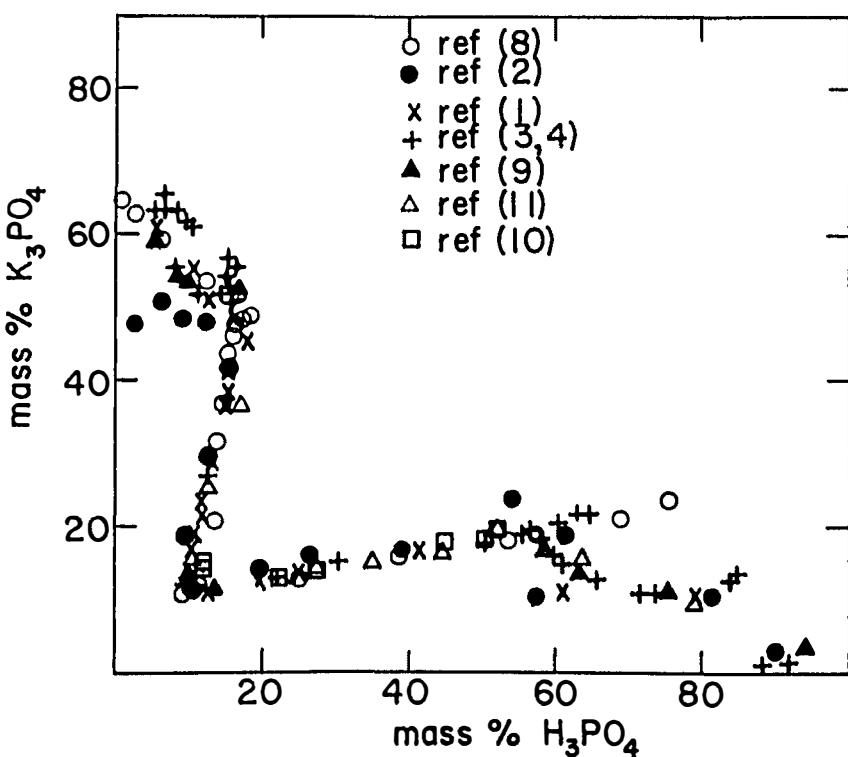


Figure 2. Solubility in the K₃PO₄-H₃PO₄-KOH-H₂O system at 298 K.

COMPONENTS:

- (1) Tripotassium phosphate; K₃PO₄; [7778-53-2]
 (2) Phosphoric acid; H₃PO₄; [7664-38-2]
 (3) Potassium hydroxide; KOH; [1310-58-3]
 (4) Water; H₂O; [7732-18-5]

EVALUATOR:

J. Eyseltová
 Charles University
 Prague, Czechoslovakia

July, 1986

CRITICAL EVALUATION:

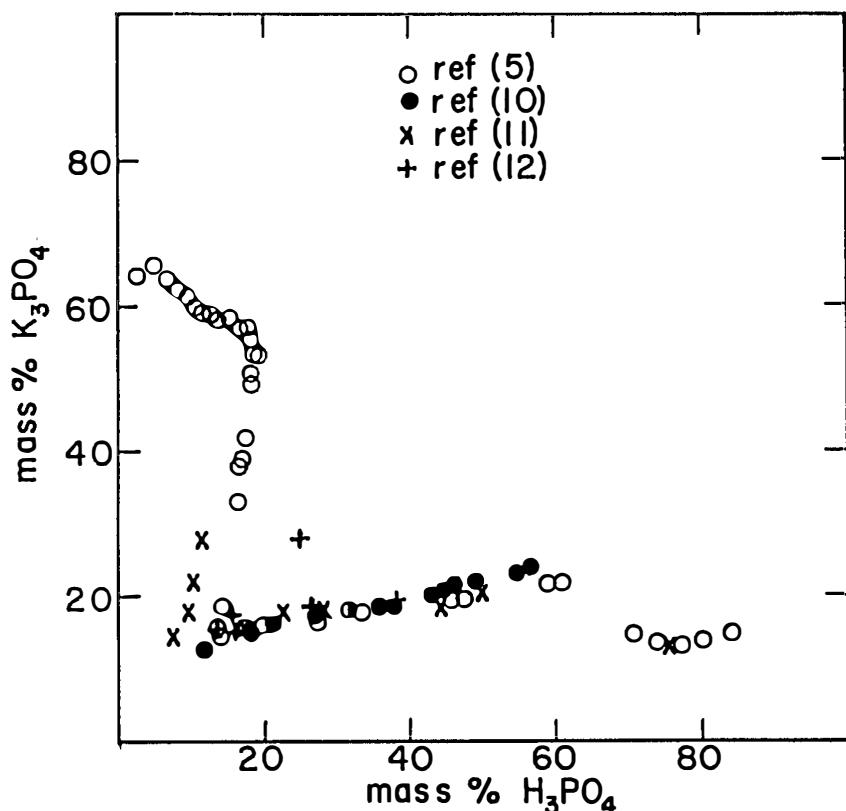


Figure 3. Solubility in the K₃PO₄-H₃PO₄-KOH-H₂O system at 323 K.

COMPONENTS:	EVALUATOR:
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Potassium hydroxide; KOH; [1310-58-3] (4) Water; H ₂ O; [7732-18-5]	J. Eysseltová Charles University Prague, Czechoslovakia July, 1986

CRITICAL EVALUATION: (cont'd)

Solubilities in some segments of this system have been determined at elevated temperatures (17,18). The system is similar to the Na₂O-P₂O₅-H₂O system (see chap. 2, p. 11). The presence of liquid-liquid immiscibility is characteristic of this system at high temperatures.

References

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18. Marshall, W.L. *J. Chem. Eng. Data* 1982, 27, 15.

COMPONENTS: (1) Dipotassium hydrogenphosphate; K ₂ HPO ₄ ; [7758-11-4] (2) Water; H ₂ O; [7732-18-5]		ORIGINAL MEASUREMENTS: Marshall, W.L.; Hall, C.E.; Mesmer, R.E. <i>J. Inorg. Nucl. Chem.</i> <u>1981</u> , 43 , 449-55.
VARIABLES: Temperature and composition.		PREPARED BY: J. Eyseltová
EXPERIMENTAL VALUES:		
Part 1. Smoothed values for the solubility of K ₂ HPO ₄ in H ₂ O.		
<i>t</i> /°C	mass%	<i>mol/kg</i> ^a
100	74.0	16.34
150	75.5	17.69
200	76.5	18.69
250	77.0	19.22
300	77.5 ^b	19.77
350	78.0 ^b	20.35
400	78.5	20.96
<p>^aThe mol/kg H₂O values were calculated by the compiler.</p> <p>^bBased on experiments at temperature and extrapolation from lower temperatures. The accuracy is ± 1.5%.</p>		
(continued next page)		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: Gold-plated stainless steel high pressure vessels were used. The samples and a small amount of water (to counterbalance the vapor pressure) were rocked at constant high temperature between 100° and 400°C for period of time of 2 to 5 hr. The vanado-molybdate method for quantitative spectrophotometric determination was used. The reagent used was that of Bridger, et al. (1). The procedure was modified slightly.	SOURCE AND PURITY OF MATERIALS: No information is given.	
		ESTIMATED ERROR: The accuracy of the temperature was ± 0.5 to 1 K. The accuracy of the smoothed values was ± 0.5%.
	REFERENCES: 1. Bridger, G.L.; Boylan, D.R.; Markey, J.W. <i>Anal. Chem.</i> <u>1953</u> , 25 , 336.	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Dipotassium hydrogenphosphate; K ₂ HPO ₄ ; [7758-11-4]	Marshall, W.L.; Hall, C.E.; Mesmer, R.E. J. Inorg. Nucl. Chem. 1981, 43, 449-55.
(2) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

Part 2. Two liquid phase regions and critical phenomena in the K₂HPO₄-H₂O system at 360-400°C.

K ₂ HPO ₄ mass%	mol/kg ^a	t ^b /°C	the phase ^c appearing	t ^c /°C	upper temperature reached/°C ^d
4.58	0.28	368.0	L ₂	378.5 ^e	390
10.0	0.64	360.0	L ₂	379.0 ^e	390
20.0	1.43	361.8	L ₂	-----	---
30.0	2.46	360.0	L ₂	377.4 ^e	390
40.0	3.83	361.0	L ₂	377.0 ^e	400
50.0	5.74	366.0	L ₁	g	400
60.0	8.61	>400	- ₁	-	400

^aThe mol/kg H₂O values were calculated by the compiler.

^bThe temperature of two-liquid phase appearance with rising temperature.

^cThe liquid-vapor critical temperature of very dilute phase.

^dThe concentrated liquid phase was always clear at the highest temperature reached.

^eL₁ is the more dilute phase; L₂ is the more concentrated phase.

^fThe actual composition of the dilute phase undergoing the critical phenomenon is estimated to be 3 mass%.

^gCould not detect this.

COMPONENTS: (1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Water; H ₂ O; [7732-18-5]		ORIGINAL MEASUREMENTS: Paravano, N.; Miel, A. <i>Gaz. Chim. Ital.</i> 1908, 11, 535-44.								
VARIABLES: Composition and temperature		PREPARED BY: J. Eyseltová								
EXPERIMENTAL VALUES:										
Saturation temperatures of the solutions of KH ₂ PO ₄ ·H ₃ PO ₄ in water.										
KH ₂ PO ₄ ·H ₃ PO ₄	mass%	mol%	KH ₂ PO ₄ ^a	mass%	mol/kg	H ₃ PO ₄ ^a	mass%	mol/kg	t/°C.	solid phase
0	0	0		0			0	0	0	ice
3.337	0.27	1.94	0.147	1.40	0.147		-0.6			"
8.824	0.69	4.82	0.385	3.47	0.385		-1.7			"
12.13	1.05	7.05	0.589	5.08	0.589		-2.5			"
20.50	1.94	11.92	1.101	8.58	1.101		-5.7			"
29.43	3.11	17.11	1.781	12.32	1.781		-6.7			"
36.98	4.32	21.50	2.506	15.48	2.506		-9.2			"
45.80	6.10	26.63	3.609	19.17	3.609		~0			KH ₂ PO ₄
50.33	7.21	29.26	4.328	21.07	4.328		10.9			"
68.44	14.30	39.79	9.263	28.65	9.263		65.2			"
72.43	16.81	42.11	11.222	30.32	11.222		78.0			"
77.60	21.05	45.11	14.798	32.48	14.798		87.5			"
85.88	31.86	49.93	25.981	35.95	25.981		105.5			"
92.18	47.57	53.59	50.353	38.59	50.353		120.0			"
95.73	63.31	55.65	95.767	40.07	95.676		134.5			"
96.10	65.47	55.87	100	40.22	100		135.0			"
98.85	88.88	57.47	100	41.39	100		137.5			"
100	100	58.14		41.86			139.0			

^aThese values were calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: There was a constant ratio of KH ₂ PO ₄ /H ₃ PO ₄ . Saturation temperatures were determined visually as the temperature of disappearance of the last crystal.	SOURCE AND PURITY OF MATERIALS: The KH ₂ PO ₄ ·H ₃ PO ₄ was prepared from an equimolar mixture of concentrated solutions of KH ₂ PO ₄ and H ₃ PO ₄ by slow crystallization.
	Analysis: observed calculated P ₂ O ₅ 60.44% 60.64% K ₂ O 20.38% 20.13%
	ESTIMATED ERROR: No information is given.
	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]		D'Ans, J.; Schreiner, O. Z. Anorg. Chem. 1911, 75, 95-102.	
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]			
(3) Water; H ₂ O; [7732-18-5]			
VARIABLES:		PREPARED BY:	
Composition at 25°C.		J. Eysseltová	
EXPERIMENTAL VALUES: Solubility in the K₃PO₄-H₃PO₄-H₂O system at 25°C.			
K ⁺ conc ^a	PO ₄ ³⁻ concn ^a	K ₃ PO ₄ mass% mol/kg	H ₃ PO ₄ mass% mol/kg solid phase
9.14	3.13	64.71	0.25 K ₃ PO ₄
8.84	3.22	62.58	0.79 "
8.42	3.44	59.61	1.68 "
7.52	3.78	53.24	3.72 "
6.90	4.15	48.85	5.61 "
6.88	4.12	48.70	5.48 "
6.80	4.08	48.14	5.32 K ₂ HPO ₄ ^c
6.80	4.05	48.14	5.19 "
6.76	3.96	47.85	4.82 "
6.50	3.85	46.01	4.34 "
6.16	3.61	43.61	3.79 "
5.24	3.25	37.09	3.12 "
4.42	2.94	31.29	2.70 "
2.90	2.36	20.53	2.11 KH ₂ PO ₄ ^c
1.70	1.71	12.03	1.49 "
1.60	1.67	11.32	1.46 "
1.48	1.46	10.46	1.21 "
1.78	3.15	12.60	4.10 "
2.18	4.65	15.43	8.51 "
2.54	6.32	17.98	19.29 "
2.66	6.76	18.83	24.89 "
2.98	8.03	21.09	70.85 "
3.32	8.80	23.50	706.4 "
^a The concentration unit is: mol/1000 g soln.			
^b These values were calculated by the compiler.			
^c These solid phases were analyzed.			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
The solid phases were separated by pressing them between two porous plates. H ₃ PO ₄ was precipitated as NH ₄ MgPO ₄ ·6H ₂ O and weighed as Mg ₂ P ₂ O ₇ . Potassium was determined gravimetrically as KCLO ₄ .		Commercial materials were used and were recrystallized before use.	
		ESTIMATED ERROR:	
		The temperature was controlled to within ± 0.05 K.	
		REFERENCES:	

COMPONENTS:								ORIGINAL MEASUREMENTS:					
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]								Flatt, R.; Brunisholz, G.; Bourgeois, J. Helv. Chim. Acta 1956, 39, 841-53.					
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]													
(3) Water; H ₂ O; [7732-18-5]													
VARIABLES:								PREPARED BY:					
Composition at 25°C.								J. Eyseltová					
EXPERIMENTAL VALUES: Solubility in the K ₃ PO ₄ -H ₃ PO ₄ -H ₂ O system at 25°C.													
K ⁺	H ⁺	K ₃ PO ₄ ^a	H ₃ PO ₄ ^a	H ₂ O	M ^b	mass% ^a	solid phase ^c						
eq%	eq%	mass%	mol/kg	mass%	mol/kg	mass%							
0	100.0	0	0	95.6	220	8.4	4.4	A					
1.6	98.4	3.3	5.5	93.9	337	5.4	2.8	"					
6.0	94.0	11.1	5.8	80.0	91.6	19.0	8.9	B					
6.4	93.6	11.2	3.9	75.3	56.8	30.5	13.5	"					
8.0	92.0	12.3	2.6	65.5	30.2	56.5	22.2	"					
9.1	90.9	13.7	2.8	63.3	28.1	60.0	23.0	"					
11.7	88.3	16.9	3.3	58.7	24.6	66.6	24.4	"					
13.0	87.0	19.0	4.0	58.7	26.9	60.0	22.3	"					
13.4	86.6	19.9	4.6	59.5	29.5	54.4	20.6	B + C					
13.3	86.7	18.3	3.2	55.1	21.2	75.8	26.6	C					
19.8	80.2	13.0	1.0	24.4	3.97	374.2	62.6	"					
22.5	77.5	11.9	0.8	19.0	2.81	511.4	69.1	"					
27.2	72.8	11.2	0.7	13.8	1.89	715.0	74.9	"					
31.4	68.6	10.4	0.6	10.5	1.35	942.0	79.2	"					
33.2	66.7	10.4	0.6	9.7	1.24	1000.0	79.9	"					
38.6	61.4	13.5	0.8	9.9	1.32	863.4	76.6	"					
43.6	56.4	19.2	1.3	11.4	1.68	620.4	69.4	"					
49.0	51.0	27.7	2.2	13.3	2.30	410.5	59.0	"					
56.0	44.0	41.8	4.6	15.2	3.59	226.7	43.0	"					
59.3	40.7	51.5	7.5	16.3	5.18	145.3	32.2	C + D					
59.0	41.0	50.9	7.3	16.3	5.09	149.3	32.8	D					
60.6	39.4	52.4	7.7	15.7	5.03	145.0	31.9	D + E					
62.1	37.9	50.8	6.9	14.3	4.19	167.5	34.9	E					
(continued next page)													
AUXILIARY INFORMATION													
METHOD/APPARATUS/PROCEDURE:						SOURCE AND PURITY OF MATERIALS:							
No information is given.						No information is given.							
						ESTIMATED ERROR:							
						No information is given.							
						REFERENCES:							

COMPONENTS:		ORIGINAL MEASUREMENTS:					
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]		Flatt, R.; Brunisholz, G.; Bourgeois, J. Helv. Chim. Acta 1956, 39, 841-53.					
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]							
(3) Water; H ₂ O; [7732-18-5]							

EXPERIMENTAL VALUES cont'd:

Solubility in the K ₃ PO ₄ -H ₃ PO ₄ -H ₂ O system at 25°C.							
K ⁺	H ⁺	K ₃ PO ₄ ^a	H ₃ PO ₄ ^a	H ₂ O ^b	M	mass% ^a	solid phase ^c
eq%	eq%	mass%	mol/kg	mass%	mol/kg		
66.1	33.9	50.9	6.5	12.1	3.33	188.8	E
66.8	33.2	51.1	6.5	11.7	3.22	191.1	"
71.5	28.5	52.8	6.6	9.7	2.6	199.8	"
74.4	25.6	53.7	6.7	8.5	2.3	205.4	"
82.3	17.7	58.7	7.8	5.8	1.7	195.2	E + F
100	0	48.1	4.4	0	0	424.4	F

^aThese values were calculated by the compiler.^bThe concentration unit is: mol g H₂O/100 eq of solute.^cThe solid phases are: A = H₃PO₄; B = KH₅(PO₄)₂; C = KH₂PO₄; D = K₅H₄(PO₄)₃·H₂O;
E = K₂HPO₄·3H₂O; F = K₃PO₄·7H₂O.

COMPONENTS: (1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [778-77-0] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Water; H ₂ O; [7732-18-5]	
VARIABLES: Temperature and composition.	

EXPERIMENTAL VALUES:**Part 1. Definition of the sections:**

section	1	2	3	4	5	6
mass% H ₃ PO ₄	4	13.5	20	30	40	50

Part 2. Eutectic points:

section	KH ₂ PO ₄ mass%	H ₃ PO ₄ mass%	H ₂ O mass%	t _s /°C. ^a	t _c /°C. ^b	solid phase
1	14.0	3.44	82.56	-2.5	-10.0	ice + KH ₂ PO ₄
2	14.38	11.54	74.08	-5	-13	"
3	19.35	16.14	64.25	-7.5	-13	"
4	20.6	24.3	55.1	-13	-14.5	"
5	21.9	31.3	46.8	-21.5	-24	"
6	20.5	39.74	39.76	-35	-39	"

^aEutectic temperature measured by heating.^bEutectic temperature measured by cooling.

(continued next page)

AUXILIARY INFORMATION**METHOD/APPARATUS/PROCEDURE:**

A visual polythermic method (1) was used as well as an isothermal method which involved conductivity measurements. Standard methods of analysis were used but no specific details are given.

SOURCE AND PURITY OF MATERIALS:

Chemically pure H₃PO₄ and reagent grade KH₂PO₄ were used.

ESTIMATED ERROR:

No information is given.

REFERENCES:

- Bergman, A.G.; Luzhnaya, N.P. *Fiziko-Khimicheskie Osnovy Izucheniya i Ispol'zovaniya solyanikh Mestorozhdeniy Khlorid-sulfatnogo Tipa*, Moscow, IAN SSSR, 1951.
- Babayan, S.G.; Pokhomov, B.G.; Melichov, I.V.; Merkulova, M.S. *Radiokhimiya* 1961, 3, 391.

COMPONENTS:

- (1) Potassium dihydrogenphosphate; KH₂PO₄; [7778-77-0]
 (2) Phosphoric acid; H₃PO₄ [7664-38-2]
 (3) Water; H₂O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Orekhov, I.I.; Tereshchenko, L. Ya.;
 Balabanovich, Ya.K.; Vlasova, T.L.
Zh. Neorg. Khim. 1969, 14, 1637-40.

EXPERIMENTAL VALUES cont'd:

Part 3. Solubility of KH₂PO₄ in aqueous solutions of H₃PO₄.^a

temperature in °C.

section	10	20	30	40	50	60	70
1	----	17.1	20.6	23.1	----	----	----
2	17.33	20.28	23.4	26.21	29.1	32.46	34.71
3	20.6	23.54	25.7	29.1	32.29	34.88	37.37
4	23.22	25.62	29.25	31.7	33.82	36.1	37.62
5	26.56	28.22	31.72	33.63	35.64	37.4	38.57
6	29.6	30.74	33.0	35.3	37.5	39.4	41.25

^aThe solubility values are given as mass%.

The authors emphasize that supersaturated solutions are formed very easily.

Part 4. The relation of composition of saturated solutions to pH is given in graphical form only.

COMPONENTS:				ORIGINAL MEASUREMENTS:									
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0]				Beremzhanov, B.A.; Voronina, L.V.; Savich, R.F.									
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				Prikl. Teor. Khim. 1978, 3-7.									
(3) Water; H ₂ O; [7732-18-5]													
VARIABLES:				PREPARED BY:									
Temperature and composition.				J. Eysseltova									
EXPERIMENTAL VALUES:													
Composition of saturated solutions in the KH ₂ PO ₄ -H ₃ PO ₄ -H ₂ O system.													
KH ₂ PO ₄ mass%	KH ₂ PO ₄ mol/kg ^a	H ₃ PO ₄ mass%	H ₃ PO ₄ mol/kg ^a	K ₂ O mass%	P ₂ O ₅ mass%	pH	refr. index	solid phase					
temp = 25°C.													
24.8	2.43	0.30	0.04	8.65	13.10	8.25	1.355	KH ₂ PO ₄					
25.8	2.69	3.75	0.54	8.92	22.02	2.38	1.361	"					
25.0	2.86	10.9	1.73	8.67	20.78	1.97	1.381	"					
25.2	2.90	11.1	1.77	8.72	21.37	1.86	1.387	"					
27.2	3.42	14.4	2.51	9.4	22.41	1.61	1.397	"					
30.8	4.59	23.7	4.40	10.92	26.70	1.12	1.417	"					
30.4	4.86	23.7	5.26	10.67	31.57	0.56	1.417	"					
34.7	6.89	28.3	7.80	12.0	33.65	0.21	1.419	"					
36.7	8.74	32.8	10.97	12.7	35.58	0.20	1.422	"					
37.9	9.83	33.8	12.18	13.3	44.32	0.16	1.423	"					
temp = 35°C.													
27.2	2.74	0.0	0.00	9.4	14.3	3.5	1.360	KH ₂ PO ₄					
28.0	3.02	4.0	0.60	9.5	17.3	2.76	1.373	"					
30.1	3.85	12.5	2.22	10.4	24.7	1.82	1.389	"					
31.9	4.47	15.7	3.05	11.1	28.0	1.20	1.400	"					
33.9	5.71	22.5	5.26	11.81	34.4	0.88	1.414	"					
38.0	6.10	27.3	7.01	13.3	39.8	0.30	1.417	"					
39.2	9.86	31.6	11.04	13.6	43.0	0.15	1.423	"					
41.5	12.44	34.0	14.16	14.3	46.6	0.02	1.424	"					
(continued next page)													
AUXILIARY INFORMATION													
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:									
Crystalline KH ₂ PO ₄ was dissolved in phosphoric acid solutions of different concentrations. Four days were allowed for equilibration. No further details are given.				No details are given.									
				ESTIMATED ERROR:									
				No details are given.									
				REFERENCES:									

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Potassium dihydrogenphosphate; K ₂ HPO ₄ ; [7778-77-0]	Beremzhanov, B.A.; Voronina, L.V.; Savich, R.F.
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]	Prikl. Teor. Khim. 1978, 3-7.
(3) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

Composition of saturated solutions in the K₂HPO₄-H₃PO₄-H₂O system.

KH ₂ PO ₄ mass%	H ₃ PO ₄ mass%	K ₂ O mass%	P ₂ O ₅ mass%	refr. index	solid phase
temp = 50°C.					
23.6	2.26	----	0.00	10.25	KH ₂ PO ₄
29.9	3.28	3.3	0.50	10.35	"
30.0	3.48	6.8	1.09	10.96	"
31.5	4.09	12.0	2.16	10.90	"
33.6	4.81	15.1	3.00	11.52	"
35.2	5.59	18.6	4.10	12.19	"
36.3	6.25	20.0	4.72	12.55	"
38.7	7.56	23.7	6.43	13.39	"
39.5	8.29	25.5	7.43	13.65	"
40.9	9.10	26.1	8.07	13.75	"
41.9	10.72	29.4	10.45	14.50	"
42.5	11.69	30.8	11.77	14.70	"
44.4	14.30	32.8	14.67	15.35	"
46.0	17.33	34.5	18.05	15.90	"

^aThe mol/kg H₂O values were calculated by the compiler.

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Potassium dihydrogenphosphate; K ₂ HPO ₄ ; [7778-77-0]		Marshall, W.L.	
(2) Potassium hydroxide; KOH; [1310-58-3]		<i>J. Chem. Eng. Data</i> 1982, 27, 175-80.	
(3) Water; H ₂ O; [7732-18-5]			

VARIABLES:	PREPARED BY:
Temperature and five K/P ratios.	J. Eysseltová

EXPERIMENTAL VALUES:	
Immiscibility and liquid-vapor critical phenomena for aqueous potassium phosphate solutions.	

K/PO ₄ ratio	solute stoichiometry		immiscibility boundary <i>t</i> ^b /°C	phase ^c	critical phenomenon	
	mass%	mol/kg ^a			<i>t</i> /°C	mass% ^d
1	5.05	0.39	386.8 ± 0.2	L ₂	389.0 ± 0.5	2.2
1	10.09	0.82	385.6 ± 0.1	L ₂	388.5 ± 0.5	2.2
1	14.8	1.28	385.7 ± 0.1	L ₂	389.0 ± 0.5	2.2
1	20.0	1.84	386.1 ± 0.2	L _x	388.9 ± 0.2	2.2
1	25.0	2.45	386.9 ± 0.4	L ₁	388.7 ± 0.5	2.2
1	29. ^e 5	3.07	387.8 ± 0.4	L ₁	389.0 ± 0.5	2.2
1	33 ^d	3.62	389 ^d	L ₁	389 ^d	2.2
1	41.5	5.21	<i>e</i>	<i>e</i> ^f	<i>e</i>	<i>e</i>
1.2	5.07	0.37	376.0 ± 0.3	L ₂	384.0 ± 0.5	1.8
1.2	10.3	0.79	371.8 ± 0.2	L ₂	383.9 ± 0.3	1.8
1.2	15.1	1.23	371.0 ± 0.1	L ₂	384.9 ± 0.3	1.8
1.2	20.2	1.75	370.9 ± 0.2	L ₂	384.0 ± 0.5	1.8
1.2	25.1	2.32	372.0 ± 0.2	L _x	385.0 ± 0.2	1.8
1.2	30.2	2.99	373.0 ± 0.1	L ₁	384.5 ± 0.5	1.8
1.2	35. ^e 1	3.74	374.9 ± 0.1	L ₁	385.1 ± 0.1	1.8
1.2	39 ^d	4.42	384.5 ^d	L ₁	384.5 ^d	1.8
1.2	40.2	4.64	<i>e</i>	<i>e</i> ^f	<i>e</i>	<i>e</i>
1.2	50.1	6.94	<i>e</i>	<i>e</i>	<i>e</i>	<i>e</i>

(continued next page)

AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The synthetic method was used. Samples of known composition were sealed in fused silica capillary tubes and heated. A chromel-alumel thermocouple was used with a digital readout unit. The experimental details are described in ref. (1).	Analytical reagent grade K ₂ HPO ₄ and K ₃ PO ₄ and certified ACS grade KH ₂ PO ₄ were used.
	ESTIMATED ERROR: The temperature at which immiscibility occurs had a precision of ± 0.1 K and an accuracy of 0.5 - 1.0 K. The critical temperature had a precision of ± 0.1-0.2 K and an accuracy of 1.0-1.5 K.
	REFERENCES: 1. Marshall, W.L.; Hall, C.E.; Mesmer, R.E. <i>J. Inorg. Nucl. Chem.</i> 1981, 43, 449.

COMPONENTS:		ORIGINAL MEASUREMENTS:				
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0]		Marshall, W.L.				
(2) Potassium hydroxide; KOH; [1310-58-3]		J. Chem. Eng. Data <u>1982</u> , 27, 175-80.				
(3) Water; H ₂ O; [7732-18-5]						
EXPERIMENTAL VALUES cont'd:						
K/PO ₄ ratio	mass%	mol/kg ^a	t ^b /°C	phase ^c	t/°C	mass% ^d
1.5	5.02	0.34	369.0 ± 2.0	L ₂	380.1 ± 0.1	1.5
1.5	10.05	0.72	364.0 ± 1.0	L ₂	380.0 ± 0.5	1.5
1.5	15.1	1.14	362.7 ± 0.1	L ₂	380.0 ± 0.5	1.5
1.5	20.1	1.61	361.7 ± 0.1	L ₂	380.0 ± 0.5	1.5
1.5	30.2	2.77	362.5 ± 0.1	L ₂	380.0 ± 0.5	1.5
1.5	39.8	4.23	365.0 ± 0.5	L _x	380.5 ± 0.5	1.5
1.5	45.2	5.28	372.5 ± 0.5	L ₁	380.0 ± 0.5	1.5
1.5	49 ^d	6.15	380 ^d	L ₁	380 ^d	1.5
1.5	50.3	6.48	e	e ^l	e	e
2 ⁶	10.3	0.66	362.4 ± 0.4	L ₂	375.9 ± 0.2	1
2 ⁶	20 ⁰	1.44	360 ⁰ ± 0.2	L ₂	376.8 ± 0.5	1
2 ⁶	56 ^d	7.31	377 ^d	L ₂ 1	377 ^d	1
2.12	4.73	0.28	369.4 ± 0.2	L ₂	377.3 ± 0.2	2
2.12	9.88	0.61	361.4 ± 0.5	L ₂	378.0 ± 0.2	2
2.12	16.7	1.12	360.9 ± 0.2	L ₂	379.2 ± 0.4	2
2.12	30.3	2.42	362.1 ± 0.2	L ₂	378.5 ± 0.4	2

^aThe mol/kg H₂O values were calculated by the compiler.

^bLower boundary of observation (appearance of second liquid phase with rising temperature).

^cL₁ = dilute liquid phase; L₂ = concentrated liquid phase; L_x = liquid phase near the consolute solution composition (where composition L₁, equals composition L₂).

^dThe mass% of solute was estimated graphically; values at upper temperature limit of immiscibility.

^eNo second liquid or critical phenomenon is observed at temperatures up to 410°C.

^fAdditional values are given in ref. (1).

COMPONENTS:	ORIGINAL MEASUREMENTS:								
(1) Tripotassium phosphate; K_3PO_4 ; [7778-53-2]	Parker, E.G.								
(2) Phosphoric acid; H_3PO_4 ; [7664-38-2]	J. Phys. Chem. 1914, 18, 653-61.								
(3) Potassium hydroxide; KOH; [1310-58-3]									
(4) Water; H_2O ; [7732-18-5]									
VARIABLES:	PREPARED BY:								
Composition at 25°C.	J. Eysseltova								
EXPERIMENTAL VALUES:	Solubility in the $KOH-H_3PO_4-H_2O$ system at 25°C.								
K^+ conc ^b	PO_4^{3-} conc ^b	K_3PO_4 ^a mass%	K_3PO_4 ^a mol/kg	KOH mass%	KOH mol/kg	H_3PO_4 ^a mass%	H_3PO_4 ^a mol/kg	H_2O ^a mass%	solid ^c phase
1.40	8.56	9.90	4.32	----	----	79.31	75.08	18.79	A
1.47	6.74	10.40	1.72	----	----	61.25	22.04	28.35	"
2.31	5.00	16.34	1.82	----	----	41.45	10.02	42.21	B
1.89	3.20	13.37	1.02	----	----	25.18	4.18	61.45	"
1.78	2.60	12.59	0.87	----	----	19.66	2.96	67.75	"
1.51	1.81	10.68	0.65	----	----	12.80	1.70	76.52	"
1.46	1.46	10.33	0.60	----	----	9.53	1.21	80.14	"
2.31	1.84	16.34	1.05	----	----	10.48	1.46	73.18	"
2.61	1.99	18.46	1.23	----	----	10.97	1.58	70.57	"
3.06	2.25	21.65	1.53	----	----	12.05	1.85	66.30	"
3.20	2.28	22.64	1.62	----	----	11.89	1.85	65.47	"
3.98	2.67	28.16	2.26	----	----	13.16	2.28	58.68	"
5.22	3.24	36.93	3.59	----	----	14.70	3.10	48.37	"
5.33	3.33	37.71	3.77	----	----	15.22	3.30	47.07	"
5.67	3.41	40.11	4.20	----	----	14.89	3.37	45.00	"
6.38	3.69	45.14	5.37	----	----	15.32	3.95	39.54	"
6.80	3.92	48.11	6.35	----	----	16.20	4.63	35.69	"
7.23	3.73	51.15	6.71	----	----	12.93	3.67	35.92	C
7.79	3.66	55.11	7.53	----	----	10.42	3.08	34.47	"
8.56	3.42	60.56	8.42	----	----	5.55	1.67	33.89	"
8.81	2.92	61.98	7.73	0.28	0.13	----	----	37.74	D
7.14	2.07	43.94	4.07	5.21	1.82	----	----	50.85	"
7.18	2.09	44.36	4.11	4.88	1.71	----	----	50.83	"
9.19	0.48	10.18	1.03	43.48	16.72	----	----	46.34	"

(continued next page)

AUXILIARY INFORMATION

<p>METHOD/APPARATUS/PROCEDURE:</p> <p>Bottles containing various amounts of phosphoric acid and potassium hydroxide in solution and in contact with a solid phase were placed in a thermostat and allowed to rotate until equilibrium was established. Phosphorus was analyzed according to ref. (1) and potassium was determined as $K_2[PtCl_6]$.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>No information is given.</p>
	<p>ESTIMATED ERROR:</p> <p>No information is given.</p>
	<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Treadwell, F.P.; Hall, W.T. <i>Analytical Chemistry</i>, Vol. II, <u>1913</u>, p. 434.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]	Parker, E.G.
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]	J. Phys. Chem. 1914, 18, 653-61.
(3) Potassium hydroxide; KOH; [1310-58-3]	
(4) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

Solubility in the KOH-H ₃ PO ₄ -H ₂ O system at 25°C.									
K ⁺ conc ^b	Po ₄ ³⁻ conc ^b	K ₃ PO ₄ ^a mass% mol/kg	KOH ^a mass% mol/kg	H ₃ PO ₄ ^a mass% mol/kg	H ₂ O ^a mass%	solid _c phase			
9.23	0.46	9.76	0.99	44.04	16.99	----	----	46.20	D
9.41	0.38	8.06	0.83	46.40	18.16	----	----	45.54	"
9.79	0.23	4.88	0.52	51.06	20.65	----	----	44.06	"
9.80	0.24	5.09	0.54	50.94	20.65	----	----	43.97	"
9.48	0.32	6.79	0.70	47.80	18.76	----	----	45.41	"
9.76	0.24	5.09	0.54	50.72	20.46	----	----	44.21	E
9.76	0.22	4.67	0.49	51.06	20.55	----	----	44.27	"
9.77	0.12	2.54	0.26	52.79	21.07	----	----	44.67	"

^aAll these values were calculated by the compiler.^bThe concentration unit is: mol/1000 g of the solution.^cThe solid phases are: A = KH₂PO₄·H₃PO₄; B = KH₂PO₄; C = K₃PO₄; D = K₃PO₄·3H₂O;
E = KOH·2H₂O.

COMPONENTS: (1) Tripotassium phosphate; K_3PO_4 ; [7778-53-2] (2) Phosphoric acid; H_3PO_4 ; [7664-38-2] (3) Potassium hydroxide; KOH; [1310-58-3] (4) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Jänecke, E. <i>Z. Phys. Chem.</i> <u>1927</u> , 127, 71-92.
VARIABLES: Composition and temperature.	PREPARED BY: J. Eysseltová

EXPERIMENTAL VALUES:

PREPARED BY:

J. Eyseltová

EXPERIMENTAL VALUES:		Solubility in the K_3PO_4 - H_3PO_4 -KOH- H_2O system.						b
K_2O	H_2O	K_3PO_4 conc ^a	K_3PO_4 mass%	KOH mol/kg	KOH mass%	H_3PO_4 mol/kg	H_3PO_4 mass%	H_2O mass%
temp. = 0°C.								
96.0	107.0	5.77	0.62	50.66	20.73	----	----	43.61
90.5	146.0	11.55	1.01	34.66	11.48	----	----	53.83
86.5	156.0	15.77	1.31	27.74	8.75	----	----	56.49
82.2	173.0	19.50	1.52	20.40	6.05	----	----	60.10
79.5	171.0	22.62	1.76	17.00	5.02	----	----	60.38
76.3	153.0	28.01	2.26	13.71	4.19	----	----	58.28
73.5	153.0	31.32	2.50	9.76	2.95	----	----	58.92
70.8	160.0	33.59	2.61	5.80	1.70	----	----	60.61
68.5	153.0	37.24	2.92	2.72	0.80	----	----	60.04
66.5	152.0	39.66	3.10	----	----	0.07	0.01	60.27
63.9	147.0	38.88	3.11	----	----	2.25	0.39	58.87
61.0	104.0	44.94	4.28	----	----	5.67	1.17	49.39
58.5	82.0	48.31	5.35	----	----	9.21	2.21	42.48
56.0	97.1	42.70	4.35	----	----	11.13	2.46	46.17
52.4	92.0	41.02	4.42	----	----	15.32	3.58	43.66
50.5	219.0	23.79	1.70	----	----	10.45	1.62	65.76
48.3	363.0	15.68	0.97	----	----	8.19	1.09	76.13
39.8	460.0	10.68	0.63	----	----	9.91	1.27	79.41
33.0	280.0	13.05	0.89	----	----	18.32	2.72	68.63
30.0	260.0	12.52	0.88	----	----	21.07	3.23	66.41
25.0	63.0	23.05	4.51	----	----	52.90	22.45	24.05
24.7	172.0	13.64	1.18	----	----	31.93	5.98	54.43
19.5	80.0	16.28	2.60	----	----	54.24	18.28	29.48

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: No information is given.	SOURCE AND PURITY OF MATERIALS: No information is given.
	ESTIMATED ERROR: No information is given.
	REFERENCES:

COMPONENTS:				ORIGINAL MEASUREMENTS:				
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				Jänecke, E.				
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				Z. Phys. Chem. 1927, 127, 71-92.				
(3) Potassium hydroxide; KOH; [1310-58-3]								
(4) Water; H ₂ O; [7732-18-5]								

EXPERIMENTAL VALUES cont'd:

Solubility in the K₃PO₄-H₃PO₄-KOH-H₂O system.

K ₂ O conc ^a	H ₂ O conc ^a	K ₃ PO ₄ ^b mass%	KOH ^b mol/kg	KOH ^b mass%	H ₃ PO ₄ ^b mass%	H ₃ PO ₄ ^b mol/kg	H ₂ O ^b mass%
temp. = 0°C.							
13.1	131.0	8.52	0.92	----	48.01	11.27	43.47
10.0	44.0	10.43	6.08	----	81.48	102.97	8.09
2.4	73.5	2.07	0.46	----	76.71	36.91	30.22
temp. = 25°C.							
96.0	97.0	6.07	0.70	53.23	23.31	----	40.70
90.5	98.0	14.35	1.58	43.07	18.02	----	42.58
86.5	102.0	19.98	2.09	35.16	13.97	----	44.86
82.2	130.0	23.14	2.07	24.22	8.20	----	52.64
79.5	121.0	26.54	2.33	19.95	6.64	----	53.51
76.3	119.0	32.36	2.94	15.83	5.45	----	51.81
73.5	127.0	34.91	3.03	10.88	3.57	----	54.21
70.8	118.0	40.06	3.55	6.92	2.32	----	53.02
68.5	119.0	43.02	3.76	3.14	1.04	----	53.84
66.5	117.5	45.95	4.01	----	0.08	0.01	53.97
63.9	101.5	47.66	4.53	----	2.76	0.56	49.58
61.0	80.2	50.88	5.61	----	6.42	1.53	42.70
58.5	82.0	48.31	5.35	----	9.21	2.21	42.48
56.0	76.0	47.82	5.67	----	12.47	3.20	39.71
52.4	88.0	41.89	4.64	----	15.64	3.76	22.47
50.5	159.0	29.30	2.38	----	12.87	2.27	57.83
48.3	292.0	18.52	1.21	----	9.67	1.37	71.81
39.8	435.0	11.18	0.67	----	10.38	1.35	78.42
33.0	249.0	14.21	1.01	----	19.95	3.09	65.84
30.0	185.0	15.82	1.29	----	26.62	4.71	57.56
25.0	59.0	23.63	5.03	----	54.23	25.00	22.14
24.7	121.0	16.79	1.80	----	39.30	9.13	43.91
19.5	58.0	18.55	4.44	----	61.79	32.09	19.66
13.1	92.0	10.25	1.51	----	57.76	18.43	31.99
10.0	44.0	10.43	6.08	----	81.48	102.87	12.44
2.4	47.8	2.44	1.53	----	90.05	122.44	7.51

^aThe concentration unit is: g/100 g of K₂O + P₂O₅.^bThese concentrations were calculated by the compiler.

COMPONENTS:					ORIGINAL MEASUREMENTS:				
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0]					Krasil'shtschikov, A.I.				
(2) Potassium hydroxide, KOH; [1310-58-3]					Izv. In-ta Fiz.-khim. An. 1933, 6, 159-68.				
(3) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]									
(4) Water; H ₂ O; [7732-18-5]									
VARIABLES:					PREPARED BY:				
Temperature and composition.					J. Eysseltova				

EXPERIMENTAL VALUES:

Part 1. The following data are given in the paper.

soln. no.	t/°C	density g/cm ³	K ₂ O concn. ^a	K ₂ O concn. ^b	K ₂ O concn. ^c	P ₂ O ₅ concn. ^a	P ₂ O ₅ concn. ^b	P ₂ O ₅ concn. ^c	H ₂ O concn. ^c
1	0	1.131	14.5	6.47	44.2	12.1	8.16	55.8	583.6
2	0	1.101	10.9	5.01	41.2	10.3	7.16	55.8	721.6
3	0	1.094	9.44	4.39	39.85	9.44	6.62	60.15	808.2
4	0	1.096	9.6	4.44	38.9	10.0	6.97	61.1	776.4
5	0	1.102	9.9	4.57	37.5	11.0	7.63	62.5	719.6
6	0	1.157	12.4	5.30	28.8	20.4	13.10	71.2	443.5
7	25	1.247	32.9	12.5	46.0	25.5	14.65	54.0	268.3
8	25	1.193	23.5	9.63	43.8	20.1	12.35	56.2	355.0
9	25	1.176	20.3	8.45	42.6	18.0	11.41	57.4	403.6
10	25	1.157	17.9	7.65	41.2	17.1	10.90	58.8	439.1
11	25	1.151	16.6	7.17	40.5	16.2	10.55	59.5	464.3
12	25	1.148	16.0	6.95	40.2	15.9	10.34	59.8	478.4
13	25	1.147	15.9	6.89	39.85	15.9	10.40	60.15	478.5
14	25	1.148	15.9	6.88	39.5	16.1	10.56	60.5	473.4
15	25	1.152	16.5	7.03	39.2	16.9	10.92	60.8	467.1
16	25	1.154	16.8	7.13	38.8	17.4	11.26	61.2	443.7
17	25	1.160	16.8	7.18	38.2	18.2	11.63	61.8	431.6
18	25	1.162	16.9	7.18	37.5	18.7	11.95	62.5	422.8
19	25	1.168	17.3	7.21	36.3	20.0	12.65	63.7	403.6
20	25	1.206	18.8	7.56	32.5	26.1	15.70	67.5	330.0
21	25	1.242	21.9	8.30	30.1	33.9	19.30	69.9	262.3
22	50		45.7	12.68	27.2	80.8	33.96	72.8	114.4
23	50		36.0	11.85	32.1	50.6	25.10	67.9	170.7

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The mixtures were allowed to equilibrate for 12-15 hours in a water thermostat. The phosphorus content was determined gravimetrically as Mg ₂ P ₂ O ₇ , the hydrogen or hydroxide ion content was determined by titration using methylorange as indicator.	Kahlbaum KH ₂ PO ₄ was used. No other information is given.
ESTIMATED ERROR:	
The temperature was controlled to within ± 0.1 K.	
REFERENCES:	

COMPONENTS:				ORIGINAL MEASUREMENTS:					
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0]				Krasil'shtschikov, A.I. Izv. In-ta Fiz.-khim. An. 1933, 6, 159-68					
(2) Potassium hydroxide; KOH; [1310-58-3]									
(3) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]									
(4) Water; H ₂ O; [7732-18-5]									

EXPERIMENTAL VALUES cont'd:

Part 1. The following data are given in the paper.

soln. no.	t/°C	density g/cm ³	K ₂ O concn. a	H ₃ PO ₄ concn. b	KOH concn. c	K ₂ O concn. a	H ₃ PO ₄ concn. b	KOH concn. c	H ₂ O concn. c
24	50		30.5	11.0	35.9	36.2	19.70	64.1	225.8
25	50		28.6	10.78	39.0	29.6	16.84	61.0	262.1
26	50		27.7	10.50	38.9	28.6	16.50	61.1	270.3
27	50		25.9	10.12	39.5	26.4	15.53	60.5	289.9
28	50		25.8	10.09	39.85	25.8	15.22	60.15	295.1
29	50		28.6	10.91	40.6	27.6	15.95	59.4	272.4
30	50		32.0	11.99	42.2	29.0	16.41	57.8	252.1
31	50		125.0	28.69	51.2	79.1	27.37	48.8	78.4

^aThe concentration unit is: mol/1000 mol H₂O.^bThe concentration unit is: g/100 g of solution.^cThe concentration unit is: g/100 g of oxides.

Part 2. The compiler has recalculated the data in Part 1 to give the following values.

soln. no.	t/°C	KH ₂ PO ₄		H ₃ PO ₄		KOH	
		mass%	mol/kg	mass%	mol/kg	mass%	mol/kg
1	0	15.65	1.363	----	----	0.013	0.002
2	0	13.73	1.169	----	----	0.003	0.000
3	0	12.68	1.067	0.006	0.000	----	----
4	0	12.83	1.086	0.385	0.045	----	----
5	0	13.21	1.131	1.03	0.122	----	----
6	0	15.31	1.449	7.06	0.928	----	----
7	25	28.09	2.871	----	----	0.035	0.008
8	25	23.68	2.280	----	----	0.018	0.004
9	25	21.88	2.056	----	----	0.011	0.002
10	25	20.90	1.941	----	----	0.005	0.001
11	25	20.23	1.863	----	----	0.002	0.000
12	25	19.83	1.817	----	----	0.001	0.000
13	25	19.91	1.827	0.024	0.003	----	----
14	25	19.88	1.829	0.265	0.033	----	----
15	25	20.31	1.883	0.45	0.058	----	----
16	25	20.60	1.923	0.712	0.092	----	----
17	25	20.75	1.962	1.12	0.146	----	----
18	25	20.75	1.962	1.56	0.205	----	----
19	25	20.83	1.995	2.46	0.327	----	----
20	25	21.85	2.222	5.95	0.840	----	----
21	25	23.98	2.644	9.38	1.436	----	----
22	50	36.64	6.28	20.51	4.88	----	----
23	50	34.24	4.51	10.00	1.83	----	----
24	50	31.79	3.65	4.31	0.689	----	----
25	50	31.15	3.36	0.82	0.123	----	----
26	50	30.34	3.24	0.94	0.139	----	----
27	50	29.24	3.05	0.39	0.056	----	----
28	50	29.15	3.04	0.44	0.063	----	----
29	50	30.59	3.24	----	----	0.004	0.001
30	50	31.45	3.37	----	----	0.013	0.003
31	50	52.49	8.14	----	----	0.13	0.050

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]		1. Berg, A.G. Izv. Akad. Nauk SSSR 1933, 167-82.	
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]		2. Berg, A.G. Izv. Akad. Nauk SSSR 1938, 147-60.	
(3) Potassium hydroxide; KOH; [1310-58-3]			
(4) Water; H ₂ O; [7732-18-5]			
VARIABLES:		PREPARED BY:	
Composition at 25°C.		J. Eyseltová	

EXPERIMENTAL VALUES:

Part 1. Solubility isotherm in the K₃PO₄-H₃PO₄-KOH-H₂O system at 25°C.

soln. no.	K ₂ O		P ₂ O ₅		H ₂ O		solid ^a phase
	mass%	mol%	mass%	mol%	mass%	mol%	
1	47.25	14.62	----	----	52.72	83.38	A1, A2(1)
2	45.51	13.78	----	----	54.49	86.22	A2
3	47.49	17.92	1.37	0.74	41.14	81.34	A1 + B3
4	46.18	14.44	1.73	0.36	52.09	85.20	B3, A1(1)
5	45.92	14.32	1.78	0.37	52.30	85.31	" "
6	45.90	14.28	1.86	0.38	52.24	85.34	A2 + B3
7	45.75	14.25	1.85	0.38	52.40	85.37	B3(1)
							A2 + B3
8	43.20	13.37	3.75	0.77	53.05	85.86	B3
9	41.69	13.65	9.04	1.97	49.27	84.38	B3
10	41.53	13.67	9.52	2.08	48.95	84.25	B3 + B7
11	41.67	13.67	9.61	2.11	48.72	84.13	B3 ^b
12	41.63	14.20	11.78	2.67	46.59	83.13	"
13	41.55	14.55	13.51	3.14	44.94	82.31	"
14	41.50	14.78	14.56	3.36	43.94	81.86	"
15	41.70	15.03	15.19	3.67	43.11	81.30	"
16	41.58	14.98	15.23	3.67	43.19	81.35	"
17	41.56	15.03	15.45	3.70	42.99	81.27	"
18	41.87	15.49	16.54	4.06	41.59	80.45	"
19	42.01	15.81	17.44	4.39	40.55	79.80	"
20	42.12	15.95	17.69	4.45	40.19	79.60	"
21	42.44	17.08	20.78	5.54	36.78	77.38	"

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The isothermal method was used. The mixtures were equilibrated in a water thermostat by agitation (900 rpm) for at least 20 hours. The solid and liquid phases were separated from each other by centrifuging at 1500-2000 rpm. The potassium content was determined as KC₁₀₄, the phosphorus content as Mg₂P₂O₇, and the water content by difference. The nature of the solid phases was determined microscopically and by the use of Schreinemakers' method.

SOURCE AND PURITY OF MATERIALS:

Kahlbaum reagent grade KOH was used. The KH₂PO₄ was recrystallized two or three times. The H₃PO₄ was imported and had a content of 90%.

ESTIMATED ERROR:

The temperature was kept constant to within ± 0.05 K. For further information see the critical evaluation.

REFERENCES:

COMPONENTS:				ORIGINAL MEASUREMENTS:							
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				1. Berg. A.G. Izv. Akad. Nauk SSSR <u>1933</u> , 167-82.							
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				2. Berg. A.G. Izv. Akad. Nauk SSSR <u>1938</u> , 147-60.							
(3) Potassium hydroxide; KOH; (1310-58-3)											
(4) Water; H ₂ O; [7732-18-5]											
EXPERIMENTAL VALUES cont'd:											
Part 1. Solubility isotherm in the K ₃ PO ₄ -H ₃ PO ₄ -KOH-H ₂ O system at 25°C.											
soln. no.	K ₂ O mass% mol%	P ₂ O ₅ mass% mol%	H ₂ O mass% mol%			solid phase ^a					
22	43.34	19.93	26.75	8.16	29.91	71.91	B3 + C				
23	41.53	13.67	9.52	2.08	48.95	84.25	B3 + B7				
24	41.50	13.66	9.57	2.10	48.93	84.24	B3 + B7				
25	37.18	11.32	8.15	1.65	54.67	87.03	B7				
26	34.39	10.51	10.99	2.23	54.62	87.26	"				
27	34.06	11.25	16.70	3.66	49.21	85.09	"				
28	39.42	16.03	24.17	6.52	36.41	77.45	B7 + C3				
29	41.48	17.99	25.62	7.37	32.90	74.64	B7 ^b				
30	41.64	18.71	27.21	8.10	31.15	73.19	C ^c				
31	41.07	18.35	27.46	8.14	31.47	73.51	"				
32	40.40	----	28.12	----	31.48	----	C ^b				
33	40.22	17.80	27.79	8.16	31.99	74.04	C ^c				
34	37.59	16.57	30.03	8.78	32.39	74.65	"				
35	37.20	16.51	30.72	9.04	32.08	74.45	"				
36	36.96	16.31	30.65	8.96	32.39	74.43	"				
37	41.90	18.06	24.89	7.11	32.21	74.83	C3 ^c				
38	40.33	16.81	24.62	6.80	35.05	76.39	"				
39	36.69	14.22	24.37	6.28	38.94	79.45	C3 ^d				
40	34.15	13.03	25.48	6.45	40.37	80.52	"				
41	34.05	12.98	25.52	6.45	40.43	80.57	"				
42	34.22	13.19	26.02	6.69	39.76	80.12	C3				
43	34.13	13.22	26.39	6.82	39.48	79.96	"				
44	34.22	13.36	26.90	7.26	38.88	79.38	"				
45	34.55	13.76	27.57	7.32	37.88	78.92	"				
46	34.92	14.16	28.90	7.77	36.82	78.07	"				
47	34.97	14.42	29.04	7.95	35.99	77.63	C3 + D ^{b,e}				
48	37.46	16.29	29.47	8.50	33.07	75.21	D ^b				
49	35.84	14.98	28.95	8.03	35.21	76.99	"				
50	35.53	14.81	29.09	8.08	35.38	77.11	C3 + D _b				
51	35.51	14.76	28.96	7.99	35.53	77.25	C3(1) _b				
52	35.16	14.54	29.01	7.96	35.83	77.50	C3 + D				
53	35.01	14.49	29.19	8.02	35.80	77.49	D				
54	34.48	14.19	29.39	8.02	36.13	77.78	"				
55	33.32	13.18	28.30	7.42	38.38	79.40	E				
56	32.65	12.65	27.75	7.13	39.60	80.22	"				
57	31.30	11.98	27.12	7.72	41.58	81.30	"				
58	26.33	8.75	24.23	5.34	49.44	85.91	"				
59	20.12	5.78	19.67	3.75	60.21	90.47	"				
60	17.68	4.84	18.13	3.29	64.19	91.87	"				
61	14.20	3.64	15.89	2.70	69.91	93.66	"				
62	11.66	2.77	13.37	2.10	74.97	95.13	"				
63	7.77	1.76	10.73	1.61	81.50	96.63	"				
64	7.14	1.60	10.45	1.56	82.41	96.84	"				
65	6.87	1.53	10.17	1.51	82.96	96.96	"				
66	6.90	1.55	11.00	1.65	82.10	96.80	"				
67	7.06	1.60	11.44	1.72	81.50	96.68	"				
68	7.08	1.62	12.12	1.84	80.80	96.54	"				
69	8.49	2.15	20.35	3.43	71.16	94.42	"				
70	9.52	2.65	26.89	4.95	63.59	92.40	"				
71	10.19	3.10	32.90	6.48	56.91	90.42	" ^d				
72	11.69	4.18	42.42	10.05	45.89	85.77	E				
73	12.50	4.84	46.38	11.91	41.12	83.25	"				
74	12.68	5.01	47.40	12.43	39.92	82.56	E				
75	12.91	5.38	49.90	13.49	37.19	81.13	"				
76	13.67	5.86	50.76	14.43	35.57	79.71	"				
77	14.27	6.44	52.78	15.80	32.95	77.76	"				
78	14.29	6.49	53.94	16.26	31.77	77.25	"				
79	12.77	5.04	47.16	12.33	40.07	82.63	E + F				

(continued next page)

COMPONENTS:		ORIGINAL MEASUREMENTS:					
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]		1. Berg, A.G. Izv. Akad. Nauk SSSR 1933, 167-82.					
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]		2. Berg, A.G. Izv. Akad. Nauk SSSR 1938, 147-60.					
(3) Potassium hydroxide; KOH; [1310-58-3]							
(4) Water; H ₂ O; [7732-18-5]							

EXPERIMENTAL VALUES cont'd:

Part 1. Solubility isotherm in the K₃PO₄-H₃PO₄-KOH-H₂O system at 25°C.

soln. no.	K ₂ O mass%	K ₂ O mol%	P ₂ O ₅ mass%	P ₂ O ₅ mol%	H ₂ O mass%	H ₂ O mol%	solid ^a phase
80	11.83	4.64	47.73	12.42	41.07	82.94	F
81	10.27	3.99	48.66	12.54	41.07	83.47	"
82	9.69	3.78	49.40	12.78	40.91	83.44	"
83	8.36	3.32	51.58	13.57	40.06	83.11	"
84	8.10	3.22	51.91	13.68	39.99	83.10	"
85	6.99	2.90	55.23	15.19	37.78	81.91	"
86	6.85	2.93	56.80	15.75	36.35	81.32	"
87	8.36	4.39	65.08	22.67	26.56	72.94	"
88	8.76	4.74	65.94	23.67	25.30	71.59	"
89	----	----	64.41	18.67	35.59	81.33	G
90	0.46	0.20	64.40	18.82	35.14	80.98	"
91	1.13	0.51	64.83	19.37	34.01	80.12	"
92	1.27	0.57	64.86	19.47	33.87	80.00	"
93	1.93	0.87	65.03	19.80	33.04	79.43	"
94	2.35	1.09	65.16	20.06	32.49	78.85	"
95	0.89	0.42	67.55	21.26	31.56	78.32	"

^aThe solid phases are: A1 = KOH·H₂O; A2 = KOH·2H₂O; B3 = K₃PO₄·3H₂O; B7 = K₃PO₄·7H₂O; C = K₂HPO₄; C3 = K₂HPO₄·3H₂O; D = K₂HPO₄·KH₂PO₄·3H₂O; E = KH₂PO₄; F = KH₅(PO₄)₂; G = 2H₃PO₄·H₂O. All the data concerning these phases are from source paper (2).

Those from source paper (1) are indicated by A(1), for example.

^bThis is a metastable equilibrium.

^cThis is given as stable in source paper (1), but as metastable in source paper (2).

^dThis is given as metastable in source paper (1), but as stable in source paper (2).

^eThese data appear in source paper (1) only.

Part 2. The compiler has calculated the following results from the data given in Part 1 above.

soln. no.	K ₃ PO ₄ mass%	K ₃ PO ₄ mol/kg	KOH mass%	KOH mol/kg	H ₃ PO ₄ mass%	H ₃ PO ₄ mol/kg
1	----	----	56.28	22.95	----	----
2	----	----	54.21	21.10	----	----
3	4.09	0.45	53.32	22.32	----	----
4	5.17	0.55	50.91	20.66	----	----
5	5.32	0.56	50.48	20.35	----	----
6	5.38	0.58	51.60	21.38	----	----
7	5.53	0.58	50.11	20.13	----	----
8	11.21	1.14	42.57	16.41	----	----
9	27.03	2.84	28.22	11.24	----	----
10	28.47	3.00	26.89	10.74	----	----
11	28.74	3.04	26.84	10.77	----	----
12	35.23	3.84	21.65	8.95	----	----
13	40.40	4.51	17.45	7.38	----	----
14	43.54	4.93	14.90	6.39	----	----
15	45.43	5.23	13.65	5.94	----	----
16	45.55	5.22	13.41	5.82	----	----
17	46.21	5.31	12.86	5.60	----	----
18	49.47	5.84	10.65	4.76	----	----
19	52.16	6.27	8.68	3.95	----	----
20	52.91	6.41	8.22	3.77	----	----

(continued next page)

COMPONENTS:

- (1) Tripotassium phosphate; K₃PO₄; [7778-53-2]
 (2) Phosphoric acid; H₃PO₄; [7664-38-2]
 (3) Potassium hydroxide; KOH; [1310-58-3]
 (4) Water; H₂O; [7732-18-5]

ORIGINAL MEASUREMENTS:

1. Berg, A.G. Izv. Akad. Nauk SSSR 1933, 167-82.
 2. Berg, A.G. Izv. Akad. Nauk SSSR 1938, 147-60.

EXPERIMENTAL VALUES cont'd:

Part 2. The compiler has calculated the following results from the data given in Part 1 above.

soln. no.	K ₃ PO ₄		KOH		H ₃ PO ₄	
	mass%	mol/kg	mass%	mol/kg	mass%	mol/kg
21	62.15	8.00	1.27	0.62	---	---
22	65.14	10.98	---	---	6.90	2.52
23	28.47	3.00	26.89	10.74	---	---
24	28.62	3.02	26.74	10.67	---	---
25	24.37	2.26	24.96	8.78	---	---
26	32.87	2.96	14.90	5.08	---	---
27	49.95	4.79	0.96	0.35	---	---
28	59.25	8.04	---	---	6.06	1.78
29	62.35	9.47	---	---	6.63	2.18
30	62.59	10.27	---	---	8.71	3.10
31	61.73	10.09	---	---	9.45	3.35
32	60.72	10.05	---	---	10.83	3.88
33	60.45	9.80	---	---	10.50	3.69
34	56.50	9.47	---	---	15.41	5.60
35	55.91	9.59	---	---	16.64	6.18
36	55.55	9.43	---	---	16.71	6.14
37	62.98	9.36	---	---	5.33	1.71
38	60.62	8.56	---	---	6.05	1.85
39	55.15	7.09	---	---	8.22	2.29
40	51.33	6.50	---	---	11.52	3.16
41	51.18	6.48	---	---	11.64	3.19
42	51.43	6.50	---	---	12.21	3.43
43	51.30	6.73	---	---	12.79	3.63
44	51.43	6.89	---	---	13.43	3.90
45	51.93	7.20	---	---	14.12	4.24
46	52.49	7.77	---	---	15.70	5.04
47	52.56	7.84	---	---	15.86	5.12
48	56.30	9.16	---	---	14.73	5.19
49	53.87	8.18	---	---	15.14	4.98
50	53.40	8.10	---	---	15.54	5.11
51	53.37	8.04	---	---	15.38	5.02
52	52.85	7.91	---	---	15.69	5.09
53	52.62	7.91	---	---	16.04	5.22
54	51.82	7.75	---	---	16.69	5.41
55	50.08	6.95	---	---	15.98	4.80
56	49.07	6.56	---	---	15.69	4.54
57	47.04	5.96	---	---	15.75	4.32
58	39.57	4.12	---	---	15.21	3.43
59	30.24	2.51	---	---	13.21	2.38
60	26.57	2.06	---	---	12.78	2.15
61	21.34	1.51	---	---	12.10	1.85
62	17.52	1.14	---	---	10.38	1.46
63	11.67	0.69	---	---	9.43	1.22
64	10.73	0.63	---	---	9.48	1.21
65	10.32	0.60	---	---	9.28	1.17
66	10.37	0.61	---	---	10.40	1.34
67	10.61	0.63	---	---	10.90	1.41
68	10.64	0.64	---	---	11.82	1.55
69	12.76	0.92	---	---	22.21	3.48
70	14.31	1.22	---	---	30.53	5.64
71	15.31	1.55	---	---	38.36	8.45
72	17.57	2.59	---	---	50.47	16.11
73	18.78	3.42	---	---	55.37	21.87
74	19.06	3.69	---	---	56.66	23.81
75	19.40	4.42	---	---	59.95	29.64
76	20.54	5.13	---	---	60.61	32.83
77	21.45	6.49	---	---	62.98	41.30

(continued next page)

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				1. Berg, A.G. Izv. Akad. Nauk SSSR .1933, 167-82.			
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				2. Berg, A.G. Izv. Akad. Nauk SSSR .1938, 147-60.			
(3) Potassium hydroxide; KOH; [1310-58-3]							
(4) Water; H ₂ O; [7732-18-5]							

EXPERIMENTAL VALUES cont'd:

Part 2. The compiler has calculated the following results from the data given in Part 1 above.

soln. no.	K ₃ PO ₄		KOH		H ₃ PO ₄	
	mass%	mol/kg	mass%	mol/kg	mass%	mol/kg
78	21.48	7.25	----	----	64.57	47.26
79	19.19	3.68	----	----	56.26	23.40
80	17.78	3.41	----	----	57.70	24.02
81	15.43	2.96	----	----	60.07	25.02
82	14.56	2.86	----	----	61.49	26.21
83	12.56	2.68	----	----	65.42	30.33
84	12.17	2.63	----	----	66.06	30.97
85	10.50	2.73	----	----	71.41	40.31
86	10.29	3.02	----	----	73.68	46.92
87	12.56	17.58	----	----	84.06	254.88
88	13.16	33.45	----	----	84.97	467.70
89	----	----	----	----	88.93	82.01
90	0.69	0.30	----	----	88.60	84.45
91	1.69	0.83	----	----	88.73	94.61
92	1.90	0.95	----	----	88.67	96.11
93	2.90	1.58	----	----	88.45	104.40
94	3.53	2.04	----	----	88.34	110.94
95	1.33	1.04	----	----	92.65	157.36

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Potassium hydroxide; KOH; [1310-58-3] (4) Water; H ₂ O; [7732-18-5]	1. Ravich, M.I. <i>Kaliy</i> 1936, 10, 33-7. 2. Ravich, M.I. <i>Izv. Akad. Nauk SSSR</i> 1938, 167-76.
VARIABLES:	PREPARED BY:
Composition at 0°C.	
J. Eysseltova	

EXPERIMENTAL VALUES:

Part 1. Solubility isotherm for the K₃PO₄-H₃PO₄-KOH-H₂O system at 0°C.

soln. no.	K ₂ O mass%	K ₂ O mol%	P ₂ O ₅ mass%	P ₂ O ₅ mol%	H ₂ O mass%	H ₂ O mol%	solid ^a phase
1	----	----	57.17	14.48	42.83	85.52	A
2	1.64	0.65	58.01	15.31	40.35	84.04	"
3	3.78	1.58	58.81	16.37	37.78	82.05	"
4	4.89	2.12	59.57	17.15	35.54	80.73	"
5	5.06	2.20	59.50	17.16	35.44	80.64	A + b ^B
6	5.75	2.67	62.01	19.09	32.24	78.24	B
7	5.51	2.52	61.60	18.70	32.89	78.78	"
8	5.27	2.37	61.11	18.23	33.62	79.40	"
9	4.93	2.12	58.92	16.76	36.15	81.12	B
10	4.38	1.76	56.12	14.99	39.50	83.25	"
11	4.33	1.73	55.87	14.85	39.80	83.42	"
12	5.30	1.95	50.19	12.26	44.51	85.79	"
13	6.05	2.17	47.93	11.41	46.02	86.42	"
14	8.15	2.88	45.02	10.55	46.83	86.57	"
15	10.37	3.70	43.6	10.33	46.01	85.97	B + C
16	10.54	3.77	43.69	10.31	45.97	85.92	"
17	10.92	4.02	45.04	11.01	44.04	84.97	C
18	10.22	3.53	41.76	9.58	48.02	86.69	C
19	8.93	2.78	35.92	7.42	55.15	89.80	"
20	8.17	2.39	32.30	6.28	59.53	91.33	"
21	6.85	1.75	22.48	3.81	70.67	99.44	"
22	5.75	1.35	15.75	2.42	78.50	96.23	"

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The isothermal method was used. At least 24 hours with constant agitation was allowed for equilibration. For the more viscous solutions the time of equilibration was 3 days. The solid and liquid phases were separated from each other by centrifuging. Schreinemakers' method was used to identify the solid phases. K ₂ O was determined by the chloride method (probably weighed as KCl--compiler), P ₂ O ₅ was determined by normal gravimetry but no details are given. The compiler supposes that water was determined by difference.	Kahlbaum reagent grade KOH was used. The H ₃ PO ₄ was imported. The KH ₂ PO ₄ was recrystallized twice. The K ₃ PO ₄ ·7H ₂ O and K ₂ HPO ₄ ·3H ₂ O were prepared by a method to be published by L.G. Berg.
ESTIMATED ERROR:	No information is given.
REFERENCES:	

COMPONENTS:	
(1) Tripotassium phosphate; K ₃ PO ₄ ;	[7778-53-2]
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]	
(3) Potassium hydroxide; KOH [1310-58-3]	
(4) Water; H ₂ O; [7732-18-5]	

ORIGINAL MEASUREMENTS:

1. Ravich, M.I. *Kaliy* 1936, 10, 33-7.
 2. Ravich, M.I. *Izv. Akad. Nauk SSSR* 1938, 167-76.

EXPERIMENTAL VALUES cont'd:

Part 1. Solubility isotherm for the K₃PO₄-H₃PO₄-KOH-H₂O system at 0°C.

soln. no.	K ₂ O mass%	P ₂ O ₅ mol%	H ₂ O mass%	H ₂ O mol%	solid ^a phase
23	4.89	1.07	9.75	1.41	85.36
24	4.41	0.93	6.66	0.93	88.93
25	6.35	1.38	8.05	1.16	85.60
26	8.50	1.92	9.80	1.49	81.70
27	15.18	3.89	15.10	2.57	69.72
28	16.20	4.24	15.98	2.78	67.82
29	21.18	6.20	19.86	3.84	58.96
30	22.49	6.72	20.45	4.05	57.06
31	27.10	9.06	24.00	5.33	48.90
32	27.63	9.31	23.97	5.36	48.40
33	29.24	10.29	25.23	5.89	45.53
34	30.54	11.04	25.69	6.16	43.77
35	31.50	11.54	25.58	6.14	42.92
36	31.03	11.00	24.05	5.66	44.92
37	30.86	10.78	23.26	5.39	45.88
38	32.70	11.54	22.23	5.20	45.07
39	34.38	12.38	21.90	5.23	43.72
40	34.49	12.47	22.06	5.29	43.45
41	27.05	8.91	23.01	5.03	49.94
42	25.94	8.15	20.80	4.33	53.26
43	24.91	7.48	18.82	3.76	56.27
44	26.92	8.30	18.60	3.80	54.48
45	29.35	9.36	18.72	3.96	51.93
46	31.29	10.41	19.75	4.36	48.96
47	32.62	11.07	19.80	4.36	47.58
48	32.83	11.17	19.80	4.47	47.37
49	32.28	10.85	19.53	4.35	48.19
50	31.26	10.07	17.55	3.6	51.19
51	30.20	9.34	15.81	3.24	53.99
52	29.46	8.89	14.80	2.96	55.74
53	29.60	8.81	13.59	2.68	56.81
54	29.28	8.66	13.41	2.63	57.31
55	29.18	8.46	11.98	2.30	58.84
56	29.20	7.97	7.25	1.32	63.55
57	29.16	7.90	7.76	1.22	64.08
58	33.19	8.89	2.12	0.38	64.69
59	38.16	10.78	1.74	0.33	60.10
60	40.16	11.68	2.11	0.41	57.73
61	41.82	12.52	2.70	0.54	55.48
62	36.23	13.23	21.04	5.10	42.73
63	33.65	11.40	18.74	4.21	47.61
64	32.65	10.69	17.45	3.79	49.90
65	31.70	10.02	15.92	3.34	52.38
66	31.18	9.58	14.40	2.93	54.42
67	31.40	9.39	12.26	2.43	56.34
68	31.52	9.41	12.00	2.38	56.48
69	32.24	9.60	11.16	2.20	56.60
70	36.82	11.61	11.00	2.30	52.18
71	41.75	15.44	16.67	4.09	41.58
72	40.93	13.98	12.52	2.84	46.55
73	41.14	12.77	5.92	1.22	52.94
74	41.86	12.71	3.66	0.74	54.48
75	42.30	12.79	2.99	0.60	54.71
76	41.95	12.57	2.62	0.52	55.43
77	41.80	12.42	2.17	0.43	56.03
78	41.68	12.26	1.50	0.29	56.82
79	41.01	11.73	-----	-----	58.99

^aThe solid phases are: A = 2H₃PO₄·H₂O; B = KH₅(PO₄)₂; C = KH₂PO₄; D = K₂HPO₄·3H₂O;
^bE = K₃PO₄·7H₂O; F = K₂HPO₄·6H₂O; G = KOH·2H₂O; H = K₃PO₄·9H₂O; I = K₃PO₄·3H₂O.

^cMetastable equilibrium.
 These data appear in source paper (2) only.

(continued next page)

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]	1. Ravich, M.I. <i>Kal'iy</i> 1936, 10, 33-7.
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]	2. Ravich, M.I. <i>Izv. Akad. Nauk SSSR</i> 1938, 167-76.
(3) Potassium hydroxide; KOH; [1310-58-3]	
(4) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

Part 2. The compiler has calculated the following values from the data given above in Part 1.

soln. no.	K ₃ PO ₄ mass% mol/kg	KOH mass% mol/kg	H ₃ PO ₄ mass% mol/kg
1	----	----	78.93 38.24
2	2.46 0.62	----	78.96 43.38
3	5.68 1.70	----	78.62 51.12
4	7.35 2.51	----	78.86 58.37
5	7.60 2.60	----	78.64 58.39
6	8.64 4.18	----	81.63 85.70
7	8.28 3.72	----	81.23 79.09
8	7.92 3.28	----	80.72 72.57
9	7.41 2.38	----	77.93 54.28
10	6.58 1.63	----	74.45 40.06
11	6.50 1.58	----	74.14 39.10
12	7.96 1.42	----	65.62 25.36
13	9.09 1.48	----	61.98 21.87
14	12.25 1.84	----	56.51 18.46
15	15.58 2.33	----	53.01 17.23
16	15.84 2.37	----	52.74 17.13
17	16.41 2.66	----	54.62 19.24
18	15.36 2.12	----	50.57 15.15
19	13.42 1.46	----	43.40 10.26
20	12.28 1.18	----	38.80 8.09
21	10.29 0.76	----	26.69 4.23
22	8.64 0.55	----	17.76 2.46
23	7.35 0.41	----	10.07 1.24
24	6.62 0.35	----	6.14 0.71
25	9.54 0.53	----	6.71 0.81
26	12.77 0.75	----	7.64 0.97
27	22.81 1.60	----	10.33 1.57
28	24.35 1.76	----	10.84 1.70
29	31.83 2.70	----	12.74 2.34
30	33.80 2.97	----	12.65 2.41
31	40.73 4.27	----	14.36 3.26
32	41.53 4.39	----	13.95 3.19
33	43.95 4.99	----	14.57 3.58
34	45.90 5.43	----	14.31 3.67
35	47.34 5.69	----	13.49 3.51
36	46.64 5.27	----	11.70 2.86
37	46.38 5.09	----	10.73 2.55
38	49.15 5.40	----	8.03 1.91
39	51.67 5.80	----	6.41 1.56
40	51.84 5.87	----	6.56 1.61
41	40.66 4.13	----	13.02 2.87
42	38.99 3.65	----	10.74 2.18
43	37.44 3.27	----	8.72 1.65
44	40.46 3.63	----	7.03 1.36
45	44.11 4.12	----	5.51 1.11
46	47.03 4.67	----	5.59 1.20
47	49.03 4.73	----	4.73 1.04
48	49.34 5.04	----	4.59 1.01
49	48.52 4.87	----	4.60 1.00
50	46.98 4.38	----	2.57 0.52
51	45.39 3.98	----	0.90 0.17
52	44.28 3.74	----	0.02 0.00
53	40.64 3.39	3.03 0.95	----
54	40.11 3.32	3.07 0.96	----
55	35.83 2.91	6.34 1.95	----
56	21.68 1.68	17.59 5.16	----
57	23.21 1.80	16.33 4.81	----

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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]	1. Ravich, M.I. <i>Kaliiy</i> 1936, 10, 33-7.
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]	2. Ravich, M.I. <i>Izv. Akad. Nauk SSSR</i> 1938, 167-76.
(3) Potassium hydroxide, KOH; [1310-58-3]	
(4) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES cont'd:

Part 2. The compiler has calculated the following values from the data given above in Part 1.

soln. no.	K ₃ PO ₄ mass%	KOH mass%	H ₃ PO ₄ mass%
	mol/kg	mol/kg	mol/kg
58	6.34	0.50	34.51
59	5.20	0.45	41.33
60	6.31	0.58	42.83
61	8.07	0.78	43.41
62	54.45	6.16	-----
63	50.58	5.08	-----
64	49.07	4.67	-----
65	47.61	4.28	-----
66	43.07	3.76	2.99
67	36.67	3.14	8.32
68	35.89	3.07	9.08
69	33.38	2.87	11.93
70	32.90	3.14	17.77
71	49.86	5.88	10.20
72	37.44	4.05	19.06
73	17.70	1.76	34.96
74	10.94	1.07	41.18
75	8.94	0.88	43.30
76	7.83	0.76	43.76
77	6.49	0.62	44.64
78	4.48	0.42	46.09
79	0.00	0.00	48.85
			17.02

COMPONENTS: (1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2] (2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2] (3) Potassium hydroxide; KOH; [1310-58-3] (4) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Berg. A.G. Izv. Akad. Nauk SSSR 1938, 161-6.
VARIABLES: Composition at 50°C.	PREPARED BY: J. Eyseltova

EXPERIMENTAL VALUES:Part 1. The solubility isotherm in the K₃PO₄-H₃PO₄-KOH-H₂O system at 50°C.

soln. no.	K ₂ O mass%	K ₂ O mol%	P ₂ O ₅ mass%	P ₂ O ₅ mol%	H ₂ O mass%	H ₂ O mol%	solid ^a phase
1	48.43	15.42	----	----	51.17	84.57	A
2	49.44	16.60	2.13	0.47	48.43	82.93	A + B
3	50.19	16.80	2.60	0.58	47.21	82.62	B
4	46.60	14.85	2.64	0.56	50.76	84.59	B
5	46.50	14.87	2.95	0.63	50.55	84.51	"
6	44.88	14.40	4.70	1.00	50.42	84.60	"
7	43.12	14.14	7.80	1.70	49.08	84.16	"
8	42.35	14.74	12.36	2.85	45.29	82.41	"
9	42.30	15.52	15.64	3.80	42.06	80.68	"
10	42.25	17.03	21.07	5.63	36.68	77.34	"
11	42.89	18.33	23.55	6.67	33.56	75.00	"
12	43.80	19.85	25.64	7.71	30.56	72.44	B + C
13	42.39	18.90	26.14	7.73	31.47	73.37	C
14	41.72	18.66	26.92	7.99	31.36	73.35	"
15	41.39	18.38	26.87	7.92	31.74	73.70	"
16	40.98	18.29	27.49	8.14	31.53	73.57	"
17	40.84	18.26	27.59	8.18	31.47	73.56	"
18	40.01	17.68	27.90	8.18	32.09	74.14	"
19	39.68	17.63	28.48	8.39	31.84	73.98	"
20	39.73	17.71	28.59	8.45	31.68	73.84	"
21	39.52	17.55	28.59	8.42	31.89	74.03	"
22	39.18	17.38	28.86	8.49	31.96	74.13	"
23	38.98	17.38	29.29	8.86	31.73	73.96	C
24	38.72	17.30	29.64	8.78	31.64	73.92	"

(continued next page)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: The isothermal method was used. At least 20 hours with agitation at 900 rpm was allowed for equilibration. The identity of the solid phase was determined microscopically and by the use of the Schreinemakers' method. The solid and liquid phases were separated from each other by centrifuging at 1500-2000 rpm. Potassium was determined as KCLO ₄ , phosphorus as Mg ₂ P ₂ O ₇ , and water by difference.	SOURCE AND PURITY OF MATERIALS: Kahlbaum reagent grade KOH was used. The KH ₂ PO ₄ was recrystallized two or three times. The phosphoric acid was imported and had a content of 90%.
	ESTIMATED ERROR: The temperature was kept constant within 0.05 K. For additional information see the Critical Evaluation.
	REFERENCES:

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				Berg, A.G.			
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				Izv. Akad. Nauk SSSR 1938, 161-6.			
(3) Potassium hydroxide; KOH; [1310-58-3]							
(4) Water; H ₂ O; [7732-18-5]							

EXPERIMENTAL VALUES cont'd:

Part 1. The solubility isotherm in the K₃PO₄-H₃PO₄-KOH-H₂O system at 50°C.

soln. no.	K ₂ O mass%	K ₂ O mol%	P ₂ O ₅ mass%	P ₂ O ₅ mol%	H ₂ O mass%	H ₂ O mol%	solid ^a phase
25	38.70	17.41	30.00	8.95	31.30	73.64	metastable
26	38.12	17.36	31.13	9.41	30.75	73.23	C + D(?)
27	37.96	17.27	31.24	9.43	30.80	73.30	C + D(?)
28	37.97	17.49	31.79	9.71	30.24	72.80	C ^b
29	38.50	17.12	29.60	8.73	31.90	74.15	E(?)
30	36.71	16.38	31.42	9.29	31.87	74.33	E(?) ^b
31	38.93	17.80	30.57	9.27	30.62	72.93	D(?) ^b
32	38.83	17.78	30.74	9.34	30.43	72.88	D(?)
33	38.06	17.19	30.78	9.22	31.16	73.59	C + D(?)
34	36.65	16.23	31.02	9.12	32.23	74.65	D
35	36.61	16.28	31.38	9.26	32.01	74.46	"
36	35.69	15.77	31.91	9.36	32.40	74.87	"
37	35.77	15.94	31.10	9.19	32.13	74.87	F
38	35.58	15.45	31.16	8.98	33.28	75.57	"
39	35.54	15.47	31.30	9.04	33.16	75.49	"
40	35.35	15.38	31.44	9.07	33.21	75.55	"
41	34.00	14.12	30.30	8.35	35.70	77.53	"
42	33.79	13.89	29.93	8.16	36.28	77.95	"
43	33.70	13.91	30.25	8.28	36.05	77.81	"
44	32.80	13.19	29.69	7.92	37.51	78.89	"
45	31.80	12.44	29.08	7.54	39.12	80.02	"
46	27.91	9.88	26.78	6.28	45.31	83.84	F
47	25.60	8.54	25.20	5.58	49.20	85.88	"
48	25.25	8.34	24.80	5.43	49.95	86.23	"
49	21.78	6.66	22.71	4.61	55.51	88.73	"
50	12.56	3.20	17.01	2.88	70.43	93.92	"
51	10.63	2.60	15.31	2.49	74.06	94.91	"
52	10.06	2.45	15.15	2.45	74.79	95.11	"
53	10.15	2.47	15.30	2.45	74.55	95.08	"
54	10.32	2.53	15.56	2.53	74.12	94.94	"
55	10.48	2.64	17.87	2.99	71.65	94.37	"
56	10.71	2.75	19.42	3.31	69.87	93.34	"
57	11.11	3.09	25.51	4.71	63.38	92.20	"
58	12.03	3.61	30.40	6.05	57.57	90.34	"
59	12.25	3.77	31.94	6.51	55.82	89.72	"
60	12.96	4.52	39.74	9.20	47.30	86.28	"
61	13.22	4.71	40.85	9.66	45.93	85.63	"
62	14.21	6.02	49.71	13.98	36.08	80.00	"
63	14.30	6.09	49.87	14.09	35.83	79.82	"
64	14.34	6.27	51.15	14.83	34.51	78.90	G
65	9.65	4.25	55.85	16.30	34.51	79.45	"
66	9.53	4.18	55.72	16.19	34.75	79.63	"
67	8.84	3.59	57.92	17.45	33.24	78.96	"
68	8.71	3.95	58.17	17.50	33.12	78.55	"
69	8.68	3.50	60.24	16.13	38.08	80.37	"
70	9.10	4.56	62.48	20.75	28.52	74.69	"
71	10.05	5.60	65.93	24.38	24.02	70.02	"

^aThe solid phases are: A = KOH·H₂O; B = K₃PO₄·3H₂O; C = K₂HPO₄; D = K₂HPO₄·KH₂PO₄·2H₂O;
E = 3K₂HPO₄·KH₂PO₄·2H₂O; F = KH₂PO₄; G = KH₅(PO₄)₂.

^bA metastable equilibrium.

COMPONENTS:				ORIGINAL MEASUREMENTS:					
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				Berg, A.G.					
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				Izv. Akad. Nauk SSSR 1938, 161-6.					
(3) Potassium hydroxide; KOH; [1310-58-3]									
(4) Water; H ₂ O; [7732-18-5]									
EXPERIMENTAL VALUES cont'd:									
Part 2. The compiler has calculated the following values from the data given in Part 1 above.									
soln. no.		K ₃ PO ₄ mass%	KOH mass%	H ₃ PO ₄ mass%					
		mol/kg	mol/kg	mol/kg					
1	---	---	58.17	24.78	---	---			
2	6.37	0.75	53.48	24.12	---	---			
3	7.77	0.94	53.62	20.76	---	---			
4	7.89	0.86	49.25	20.48	---	---			
5	8.82	0.97	48.39	20.16	---	---			
6	14.05	1.51	42.31	17.28	---	---			
7	23.33	2.50	32.86	13.37	---	---			
8	36.96	4.15	21.13	8.99	---	---			
9	46.78	5.51	13.29	5.93	---	---			
10	63.02	8.10	0.36	0.17	---	---			
11	64.47	9.27	----	----	2.80	0.87			
12	65.83	10.65	----	----	5.05	1.77			
13	63.71	10.15	----	----	6.72	2.32			
14	62.71	10.17	----	----	8.26	2.90			
15	62.21	9.98	----	----	8.42	2.92			
16	61.59	10.06	----	----	9.56	3.38			
17	61.38	10.03	----	----	9.79	3.47			
18	60.14	9.74	----	----	10.80	3.79			
19	59.64	9.85	----	----	11.83	4.23			
20	59.72	9.92	----	----	11.94	4.30			
21	59.40	9.81	----	----	12.09	4.32			
22	58.89	9.76	----	----	12.70	4.56			
23	58.59	9.86	----	----	13.43	4.90			
24	58.20	9.89	----	----	14.09	5.19			
25	58.18	10.07	----	----	14.60	5.47			
26	57.30	10.33	----	----	16.57	6.47			
27	57.05	10.29	----	----	16.83	6.57			
28	57.07	10.60	----	----	17.57	7.07			
29	57.87	9.75	----	----	14.19	5.18			
30	55.18	9.67	----	----	17.94	6.81			
31	58.51	10.50	----	----	15.23	5.92			
32	58.36	10.53	----	----	15.54	6.07			
33	57.21	10.10	----	----	16.12	6.17			
34	55.09	9.44	----	----	17.43	6.47			
35	55.03	9.59	----	----	17.96	6.78			
36	53.64	9.35	----	----	19.33	7.30			
37	53.76	9.02	----	----	18.15	6.59			
38	53.48	8.95	----	----	18.37	6.66			
39	53.42	8.99	----	----	18.59	6.77			
40	53.13	8.95	----	----	18.91	6.90			
41	51.10	7.86	----	----	18.27	6.09			
42	50.79	7.64	----	----	17.91	5.84			
43	50.65	7.71	----	----	18.41	6.07			
44	49.30	7.16	----	----	18.26	5.74			
45	47.80	6.60	----	----	18.11	5.42			
46	41.95	4.89	----	----	17.63	4.45			
47	38.48	4.07	----	----	17.05	3.91			
48	37.95	3.94	----	----	16.74	3.77			
49	32.73	3.02	----	----	16.26	3.25			
50	18.87	1.34	----	----	14.78	2.27			
51	15.97	1.07	----	----	13.77	2.00			
52	15.12	1.00	----	----	13.94	2.00			
53	15.25	1.01	----	----	14.09	2.03			
54	15.51	1.04	----	----	14.33	2.08			
55	15.75	1.11	----	----	17.41	2.65			
56	16.09	1.17	----	----	19.39	3.06			
57	16.70	1.41	----	----	27.52	5.03			
58	18.08	1.76	----	----	33.64	7.11			

(continued next page)

COMPONENTS:				ORIGINAL MEASUREMENTS:					
(1) Tripotassium phosphate; K ₃ PO ₄ ; [7778-53-2]				Berg, A.G.					
(2) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]				Izv. Akad. Nauk SSSR <u>1938</u> , 161-6.					
(3) Potassium hydroxide; KOH; [1310-58-3]									
(4) Water; H ₂ O; [7732-18-5]									
EXPERIMENTAL VALUES cont'd:									
Part 2. The compiler has calculated the following values from the data given in Part 1 above.									
soln. no.		K ₃ PO ₄	KOH		H ₃ PO ₄				
mass%	mol/kg	mass%	mol/kg	mass%	mol/kg				
59	18.39	1.88	----	----	35.62	7.90			
60	19.48	2.65	----	----	45.89	13.52			
61	19.87	2.84	----	----	47.24	14.66			
62	21.35	5.06	----	----	58.79	30.22			
63	21.49	5.17	----	----	58.95	30.76			
64	21.55	5.71	----	----	60.69	34.88			
65	14.50	4.53	----	----	70.41	47.65			
66	14.32	4.39	----	----	70.33	46.78			
67	13.28	4.86	----	----	73.84	58.58			
68	13.09	4.88	----	----	74.28	60.04			
69	13.04	6.27	----	----	77.16	80.43			
70	13.67	10.13	----	----	79.96	128.37			
71	15.10	86.51	----	----	84.07	1042.9			

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [778-77-0]				Mýl, J.; Šolc, Z.			
(2) Potassium hydroxide; KOH; [1310-58-3]				Collection Czechoslov. Chem. Comm. 1960, 25, 2414-8.			
(3) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]							
(4) Water; H ₂ O; [7732-18-5]							

VARIABLES:	PREPARED BY:
Temperature and composition	J. Eyseltová

EXPERIMENTAL VALUES:								
Composition of saturated solutions in the KH ₂ PO ₄ -H ₃ PO ₄ -KOH-H ₂ O system.								
K ₂ O mass%	P ₂ O ₅ mass%	KH ₂ PO ₄ mass% ^a	KOH ^a mol/kg	H ₃ PO ₄ mass% ^a	H ₂ O ^a mol/kg	H ₂ O ^a mass%	temp = 25°C.	
10.0	12.4	23.78	1.18	2.11	0.25	----	----	74.11
12.19	13.65	26.17	1.37	3.73	0.47	----	----	70.09
16.7	16.65	31.93	1.91	6.73	0.98	----	----	61.34
24.25	21.7	41.61	3.28	11.73	2.24	----	----	46.65
6.85	10.4	19.79	0.91	----	----	0.11	0.01	80.10
7.79	13.85	22.51	1.11	----	----	2.92	0.20	74.58
8.78	18.75	25.37	1.39	----	----	7.62	0.58	67.01
8.97	23.18	25.92	1.57	----	----	13.34	1.12	60.74
9.84	30.6	28.43	2.10	----	----	21.78	2.23	49.79
10.86	37.6	31.38	2.93	----	----	29.32	3.81	39.30
11.55	41.85	33.37	3.73	----	----	33.75	5.24	32.87
9.9	51.3	28.61	4.97	----	----	50.23	12.11	21.16
6.3	59.8	18.20	5.42	----	----	69.46	28.73	12.33

(continued next page)

AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A modification of Toepler's method (1) was used.	Reagent grade materials were used.
	ESTIMATED ERROR:
	No information is given.
	REFERENCES:
	1. Mýl, J.; Kvapil, J. Colln. Czechoslov. Chem. Commun. 1960, 25, 194.

COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [778-77-0]				Mýl. J.; Šolc. Z. Collection Czechoslov. Chem. Comm. 1960, 25, 2414-8.			
(2) Potassium hydroxide; KOH; [1310-58-3]							
(3) Phosphoric acid; H ₃ PO ₄ ; [7664-38-2]							
(4) Water; H ₂ O; [7732-18-5]							

EXPERIMENTAL VALUES cont'd:

Composition of saturated solutions in the KH₂PO₄-H₃PO₄-KOH-H₂O system.

K ₂ O mass%	P ₂ O ₅ mass%	KH ₂ PO ₄ ^a mass%	KH ₂ PO ₄ ^a mol/kg	KOH ^a mass%	KOH ^a mol/kg	H ₃ PO ₄ ^a mass%	H ₃ PO ₄ ^a mol/kg	H ₂ O ^a mass%
temp = 30°C.								
10.2	12.9	24.74	1.24	1.95	0.24	----	----	73.31
12.5	14.21	27.25	1.45	3.66	0.47	----	----	69.09
17.5	17.22	33.02	2.03	7.23	1.08	----	----	59.75
24.4	22.0	42.19	3.34	11.44	2.20	----	----	46.37
7.15	10.8	20.66	0.96	----	----	0.04	0.00	79.30
8.4	14.6	24.27	1.22	----	----	2.68	0.19	73.04
9.35	19.5	27.02	1.52	----	----	7.47	0.58	65.51
9.5	23.8	27.45	1.70	----	----	13.10	1.12	59.45
10.37	30.8	29.96	2.24	----	----	20.95	2.18	49.08
11.3	37.8	32.65	3.10	----	----	28.68	3.78	38.67
11.9	42.0	34.39	3.90	----	----	33.23	5.24	32.38
10.3	51.0	29.76	5.14	----	----	49.00	11.76	21.25
6.76	59.9	19.53	6.07	----	----	68.64	29.62	11.82
temp = 40°C.								
10.8	14.2	27.23	1.41	1.64	0.21	----	----	71.13
13.3	15.6	29.91	1.65	3.51	0.47	----	----	66.57
18.1	18.5	35.48	2.26	6.94	1.07	----	----	57.59
24.5	22.6	43.34	3.51	11.32	2.22	----	----	45.34
8.43	12.7	24.35	1.18	0.00	0.00	----	----	75.65
9.4	16.15	27.16	1.42	----	----	2.74	0.20	70.10
10.45	20.95	30.20	1.77	----	----	7.18	0.59	62.62
10.5	25.0	30.34	1.96	----	----	12.67	1.13	56.99
11.4	31.8	32.94	2.58	----	----	20.19	2.20	46.87
12.1	38.3	34.96	3.44	----	----	27.71	3.79	37.33
12.6	42.4	36.41	4.28	----	----	32.33	5.28	31.26
8.68	59.3	22.16	7.00	----	----	66.20	29.02	11.64
temp = 50°C.								
11.55	15.8	30.30	1.63	1.27	0.16	----	----	68.43
14.3	17.25	33.08	1.91	3.40	0.48	----	----	63.52
18.7	19.7	37.78	2.50	6.70	1.08	----	----	55.52
9.77	14.8	28.23	1.45	----	----	0.11	0.01	71.66
10.5	17.75	30.34	1.66	----	----	2.66	0.20	67.00
11.56	22.4	33.40	2.05	----	----	6.88	0.59	59.72
11.69	26.25	33.78	2.28	----	----	11.92	1.12	54.30
12.4	32.7	35.83	2.94	----	----	19.35	2.20	44.82
13.1	38.9	37.85	3.90	----	----	26.45	3.78	35.69
13.42	42.6	38.78	4.70	----	----	30.90	5.20	30.23
8.68	59.3	25.08	8.30	----	----	63.82	29.34	11.10

^aThese values were calculated by the compiler.

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Potassium dihydrogenphosphate; KH ₂ PO ₄ ; [7778-77-0]		Punin, Yu.O.; Mirenkova, T.F.; Artamanova, O.I.; Ul'yanova, T.P. <i>Zh. Neorg. Khim.</i> 1975, 20, 2813-5.
VARIABLES:		PREPARED BY:
Temperature and composition.		J. Eyseltová

EXPERIMENTAL VALUES:

Parameters a_1 of the equation: $c_t = a_0 + a_1 t + a_2 t^2 + \dots + a_5 t^5$
were calculated and are given in the Table below. c_t is the

concentration of the saturated solution (as g/100 g of solvent)

at the temperature $t^\circ\text{C}$.

solvent	concn ^b	a_0	$a_1 \times 10$	$a_2 \times 10^3$	$a_3 \times 10^5$	$a_4 \times 10^7$	$a_5 \times 10^9$	σ^a (g/100 g)
H ₂ O		14.958	2.881	4.914	1.826	2.311	0	0.03
H ₃ PO ₄	1.72	16.478	2.229	5.354	0	0	0	0.16
"	5.00	17.509	3.008	6.239	6.051	4.889	0	0.06
"	9.94	20.184	4.177	1.906	1.784	0	0	0.13
"	14.90	32.498	8.209	64.574	135.678	137.658	51.195	0.16
KOH	2.00	14.682	12.533	52.068	147.490	178.247	80.992	0.14
"	4.92	30.370	2.826	6.213	6.207	4.963	0	0.03
"	10.04	48.563	0.694	15.135	21.332	13.776	0	0.08
"	15.68	68.154	3.231	38.031	80.746	84.653	31.888	0.08

^aThis is the mean quadratic error.

^bThe concentration unit is: g/100 g.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: Nine solubility polytherms were studied. They differed from each other in the composition of the solvent. The pH of each solvent was measured. For each polytherm, 10-14 samples were prepared by precise weighing. The saturation temperature of each sample was determined by using an apparatus constructed for measuring crystal growth rate (1).	SOURCE AND PURITY OF MATERIALS: All the components were of a "special purity" grade.
	ESTIMATED ERROR: The accuracy of the saturation temperature was ± 0.1 K.
	REFERENCES: 1. Petrov, T.G.; Trejbis, E.B.; Kosatkin, A.P. "Vyrashchivanie Kristallov iz Rastvorov", Nedra, Leningrad, 1967.

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]	EVALUATOR: J. Eyseltová Charles University Prague, Czechoslovakia May, 1985
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CRITICAL EVALUATION:**THE BINARY SYSTEM**

Several papers report solubility data for this system (1-6). Empirical smoothing equations describing the temperature dependence of this solubility have also been reported (6,7). Solubility data for this system have also been reported as part of a study of multicomponent systems having KH_2PO_4 as one component (8-24). Some of these values are clearly incorrect and were rejected immediately (8-10). The same is true for some of the solubility values reported for 323 K (11,12). In another report (13) the solubility of KH_2PO_4 at 298 K is given as 20.3% and also as 21.6%. The latter value is an obvious error. All the other data from the studies of multicomponent systems were evaluated together with the data in refs. (1-6).

The evaluation procedure was the same as that described in chapter 3. It was possible to use only one equation because no hydrate formation has been observed. The assumptions concerning the precision of the data were the same as those used in chapter 3. The general solubility equation [1] was used. Equation [2] was used for the

$$\ln \frac{x}{x_0} = A \cdot \left(\frac{1}{T} - \frac{1}{T_0} \right) + B \cdot \ln \left(\frac{T}{T_0} \right) + C \cdot (T - T_0) \quad [1]$$

selection of experimental points during the iterative procedure.

$$\left| \frac{x_j - x(T_j)}{x(T_j)} \right| \leq 0.015 \quad [2]$$

Table I is a summary of the solubility data used in the evaluation procedure. All the data from only two reports (22,24) were eliminated during the iteration procedure.

The results of this evaluation procedure are summarized in Table II, which gives the values obtained for the parameters in equation [1].

Table III is a list of the recommended solubility values calculated from equation [1]. The other smoothing equations that have been suggested (6,7) give values that are 8-10% larger than the recommended values (Table III) in the 273-288 K temperature interval. Above 288 K the one equation (6) gives values that agree with those in Table III while the other equation (7) gives values that have a constant error of about +10%.

COMPONENTS:

(1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]
 (2) Water; H_2O ; [7732-18-5]

EVALUATOR:

J. Eyseltová
 Charles University
 Prague, Czechoslovakia
 May 1985

CRITICAL EVALUATION: (cont'd)

Table I. Solubility of KH_2PO_4 in water.

T/K	mass%	ref.	weight	T/K	mass%	ref.	weight
			init/final				init/final
273.2	10.48	1	1/0	298.2	20.30	13	1/0
273.2	12.48	2	1/0	298.2	19.92	4	1/1
273.2	12.68	4	1/0	298.2	19.93	19	1/1
273.2	12.88	6	1/0	298.2	20.3	21	1/0
273.2	12.15	15	1/0	298.2	20.21	23	1/1
273.2	11.8	5	1/1	298.2	20.42	12,13	2/0
273.2	12.2	3	1/0	299.2	20.00	3	1/0
273.2	12.7	4	1/0	300.2	20.00	5	1/0
273.2	12.41	19	1/0	303.2	21.90	6	1/1
273.2	12.30	24	1/0	303.2	21.0	3	1/0
274.0	12.00	5	1/1	305.0	22.00	5	1/0
278.2	14.00	6	1/0	305.4	22.00	3	1/0
283.2	15.50	6	1/0	308.2	23.65	6	1/1
283.2	14.95	15	1/1	308.2	22.90	15	1/0
283.2	15	5	1/1	313.2	25.10	6	1/1
283.2	14.9	3	1/1	313.2	25.00	20	1/1
283.2	15.20	24	1/0	313.2	27.15	22	1/0
286.8	16.00	5	1/1	313.2	27.12	22	1/0
287.3	16.00	3	1/1	318.2	26.90	6	1/1
288.2	16.78	2	1/0	323.2	29.26	1	1/1
293.0	18.00	5	1/1	323.2	29.15	4,16	2/2
293.2	18.45	6	1/1	323.2	29.00	6,21	2/2
293.2	18.20	15	1/1	323.2	29.42	14	1/0
293.2	18.2	5	1/1	323.2	29.1	4	1/1
293.2	18.50	18	1/0	323.2	28.70	19	1/1
293.2	17.8	3	1/0	333.2	33.40	6	1/0
293.2	17.73	2	1/0	333.2	32.37	20	1/0
293.2	18.04	20	1/0	343.2	36.68	1	1/1
293.2	18.00	24	1/0	343.2	36.65	1	1/1
293.8	18.00	3	1/0	343.2	37.05	6	1/1
298.2	19.87	1	1/1	348.2	39.20	21	1/1
298.2	20.15	1	1/1	348.2	38.61	19	1/1
298.2	19.90	4	1/1	353.2	41.30	6	1/1
298.2	20.04	6	1/1	353.2	40.75	20	1/1
298.2	19.80	15	1/1	356.2	41.38	1	1/0
298.2	20.07	2	1/1	356.2	41.92	1	1/1
298.2	20.49	16	1/0	363.2	45.5	6	1/1
				378.3	52.7	17	1/1

Table II. Values for the parameters of equation [1].

A	B	C	x_0	T_0
value	σ^a	value	σ^a	value
-2.121×10^4	10	-1.224×10^2	0.5	0.1929
				0.0005
				0.031948
				298.2

^a Standard deviation for the respective parameter.

(continued next page)

COMPONENTS:	EVALUATOR:
(1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]	J. Eyseltová Charles University Prague, Czechoslovakia
(2) Water; H_2O ; [7732-18-5]	May 1985

CRITICAL EVALUATION: (cont'd)

Table III. Recommended values calculated from equation [1] for the solubility of KH_2PO_4 in water.

T/K	mole fraction	mol/kg	mass%
273.2	0.017287	0.98	11.74
278.2	0.019886	1.13	13.30
283.2	0.022653	1.29	14.91
288.2	0.025586	1.46	16.56
293.2	0.028684	1.64	18.25
298.2	0.031948	1.83	19.97
303.2	0.035385	2.04	21.71
308.2	0.039006	2.25	23.48
313.2	0.042825	2.48	25.28
318.2	0.046861	2.73	27.10
323.2	0.051139	2.99	28.95
328.2	0.055690	3.28	30.84
333.2	0.060548	3.58	32.76
338.2	0.065757	3.91	34.73
343.2	0.071367	4.27	36.75
348.2	0.077434	4.66	38.82
353.2	0.084028	5.10	40.96
358.2	0.091224	5.58	43.15
363.2	0.099113	6.11	45.41
368.2	0.10780	6.71	47.74
373.2	0.11740	7.39	50.14
378.2	0.12806	8.16	52.62

MULTICOMPONENT SYSTEMS

Solubility measurements have been made for a variety of multicomponent systems that include potassium dihydrogenphosphate as a component. However, an evaluation cannot be made of most of these studies because of a lack of corroborating results. The systems may be differentiated according to the type of solid phases that are in equilibrium with the saturated solutions.

The formation of compounds has been reported for two of these systems: the compounds $\text{KH}_2\text{PO}_4 \cdot \text{KHSeO}_4$ and $3\text{KH}_2\text{PO}_4 \cdot \text{KHSeO}_4$ were identified in the KH_2PO_4 - KHSeO_4 - H_2O system at 298 K (18); the compound $\text{Ca}_9\text{K}_4\text{H}_{32}(\text{PO}_4)_{18} \cdot 10\text{H}_2\text{O}$ was found to be present in the KH_2PO_4 - $\text{Ca}(\text{H}_2\text{PO}_4)_2$ - H_3PO_4 - H_2O system at 298 K (25).

Solid solutions were found to be present in several systems. A continuous series of solid solutions is present in the KH_2PO_4 - $\text{NH}_4\text{H}_2\text{PO}_4$ - H_2O system (10-13, 23, 26, 27). Some of the solubility data at 298 K (11-13, 23) are compared on Figure 1. All the values agree fairly well with each other and these are accepted as tentative values. However, the discontinuity around 2.9-3 molal $\text{NH}_4\text{H}_2\text{PO}_4$ and 1 molal KH_2PO_4 cannot be explained. Further work is needed in this part of the system. The solid solutions, which have been designated β -solid solutions (26), are also found in the K^+ , $\text{NH}_4^+||\text{Cl}^-$, H_2PO_4^- - H_2O system at 273 K (10, 29). Two forms of solid solutions are said to exist in the KH_2PO_4 - $\text{NH}_4\text{H}_2\text{PO}_4$ - $\text{CO}(\text{NH}_2)_2$ - H_2O system (28). In addition, there are also the α -, β - and γ -modifications of urea. This is true also of the KH_2PO_4 - $\text{CO}(\text{NH}_2)_2$ - H_2O system (15).

A series of solid solutions was also observed in the KH_2PO_4 - KH_2AsO_4 - H_2O system at 280 K (9). These results cannot be evaluated, but it should be noted that the values reported for the solubility of KH_2PO_4 in water are in error by about 50%.

In all the other systems having two or more saturating components, no solid solutions or compounds were found to be present. These systems are referred to individually.

1. The KH_2PO_4 - $[(\text{C}_2\text{H}_5)_3\text{N}]\text{H}_3\text{PO}_4$ - H_2O system. Solubility measurements were made at 293, 313, 333 and 353 K (20).
2. The KH_2PO_4 - KBO_2 - H_2O system. Solubility values have been reported for 298 and 323 K (8). These values cannot be evaluated but mention should be made of the fact that the value given for the solubility of KH_2PO_4 in water is incorrect.
3. The KH_2PO_4 - KNO_3 - H_2O system. There are four reports of solubility values for this system (1, 5, 16, 17). The results are compared on Figure 2.

(continued next page)

COMPONENTS:

- (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]
 (2) Water; H_2O ; [7732-18-5]

EVALUATOR:

J. Eysseltová
 Charles University
 Prague, Czechoslovakia

May 1985

CRITICAL EVALUATION:

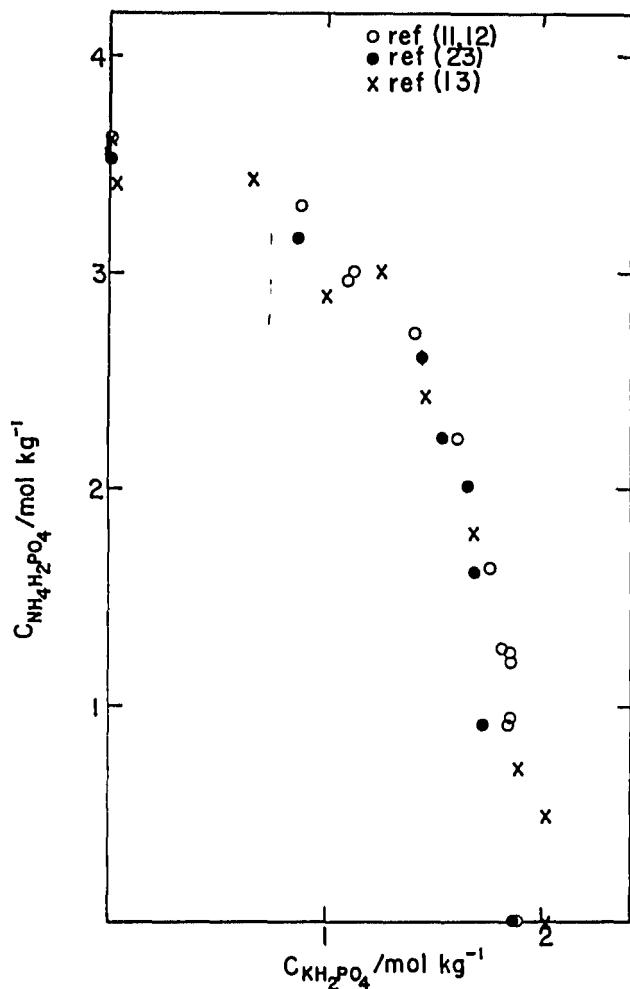


Figure 1. Solubility in the $\text{KH}_2\text{PO}_4-\text{NH}_4\text{H}_2\text{PO}_4-\text{H}_2\text{O}$ system at 298 K.

COMPONENTS:

- (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]
 (2) Water; H_2O ; [7732-18-5]

EVALUATOR:

J. Eysseľtová
 Charles University
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May 1985

CRITICAL EVALUATION:

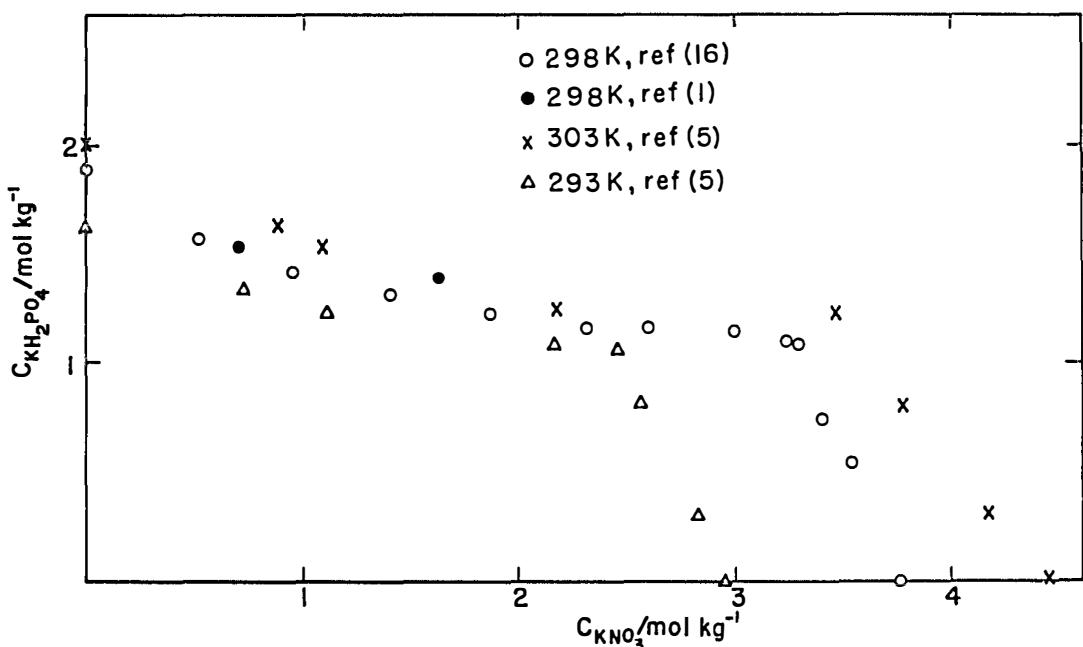


Figure 2. Solubility of KH_2PO_4 in aqueous KNO_3 .

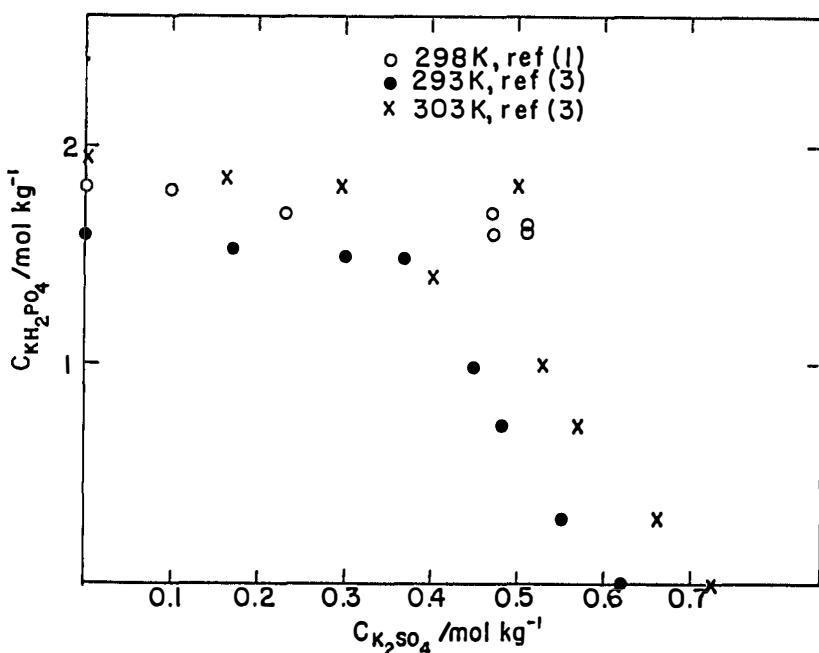


Figure 3. Solubility of KH_2PO_4 in aqueous K_2SO_4 .

COMPONENTS:

- (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]
 (2) Water; H_2O ; [7732-18-5]

EVALUATOR:

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May 1985

CRITICAL EVALUATION:

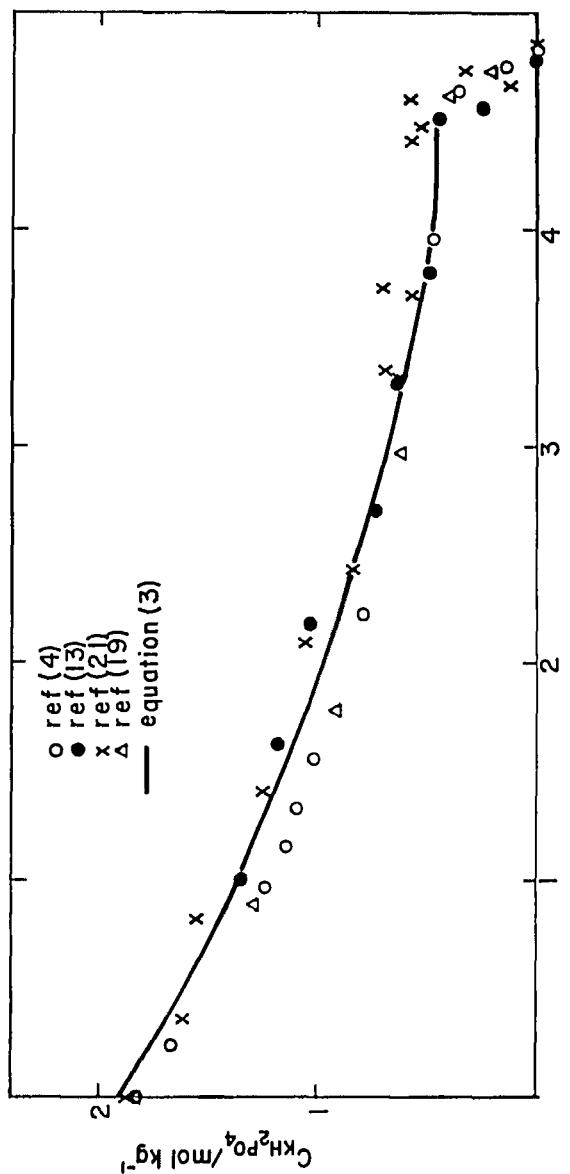


Figure 4. Solubility of KH_2PO_4 in aqueous KCl at 298 K.

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]	EVALUATOR: J. Eyssetlová Charles University Prague, Czechoslovakia May 1985
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CRITICAL EVALUATION: (cont'd)

4. The $\text{KH}_2\text{PO}_4\text{-K}_2\text{SO}_4\text{-H}_2\text{O}$ system. The solubility values reported for this system (1, 3, 30) are compared on Figure 3.

5. The $\text{KH}_2\text{PO}_4\text{-KCl}\text{-H}_2\text{O}$ system. Several investigators have published solubility values for this system (4, 10, 13, 19-22). The solubility of KH_2PO_4 at 298 K may be expressed by the smoothing equation of Kirgintsev (31) where m_1 is the molality of KH_2PO_4 and y_1 is its solute mole

$$\log m_1 = \log 1.87 + (0.59 \pm 0.07) \log y_1 \quad [3]$$

fraction. The results calculated from equation [3] are compared with the experimental values on Figure 4.

In addition to the solubility values reported above, there are values given for the $\text{KH}_2\text{PO}_4\text{-H}_2\text{O}_2\text{-H}_2\text{O}$ system at 273 K (2); some values for the $\text{KH}_2\text{PO}_4\text{-HCONH}_2\text{-H}_2\text{O}$ system at 298 K (32), at 323 K (14) and a polytherm in ref. (33); two values for the solubility of KH_2PO_4 in aqueous potassium acetate and in aqueous potassium carbonate at 298 K (1). The latter system cannot be treated as a ternary system because of the observed decomposition of the K_2CO_3 .

No solid solutions or compounds were observed in a study of the 2K^+ , $\text{Ca}^{2+}||2\text{Cl}^-$, $\text{KH}_2\text{PO}_4\text{-H}_2\text{O}$ system at 298 K (34).

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COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Apfel, O. Dissertation, Technical University, Darmstadt, 1911.		
VARIABLES: Temperature and composition.		PREPARED BY: J. Eyssel tová		
EXPERIMENTAL VALUES:				
Composition of the saturated liquid phase.				
$t/^\circ\text{C.}$	PO_4^{3-} concn ^b	K^+ concn ^b	KH_2PO_4 ^a mass% 20.15 ^c 36.68 36.65 ^c	mol/kg 0.86 1.82 1.85 ^c 3.04 4.26 4.25 ^c 5.19 5.30 ^c
0	0.77	0.77	10.48	0.86
25	1.47	1.48	19.87	1.82
50	2.15	2.15	29.26	3.04
70	2.695	2.693	36.68	4.26
83	3.04	3.08	41.38	5.19
			41.92 ^c	5.30 ^c
^a These values were calculated by the compiler.				
^b The concentration unit is: mol/1000 g of solution.				
^c In these calculations the potassium content was taken as the starting point of the calculation. In the other calculations it was the PO_4^{3-} content.				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE: All the experiments were carried out in a water thermostat. Equilibrium was checked by repeated analysis. The solid and liquid phases were separated from each other by filtration through a platinum wire mat. The phosphate ion content was determined gravimetrically as $\text{Mg}_2\text{P}_2\text{O}_7$, and potassium was determined as KClO_4 .	SOURCE AND PURITY OF MATERIALS: No information is given.			
ESTIMATED ERROR:				
No information is given.				
REFERENCES:				

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Menzel, H.; Gabler, C. <i>Z. Anorg. Chem.</i> , 1929, 177, 187-214.						
VARIABLES: Temperature and composition.		PREPARED BY: J. Eyssettová						
EXPERIMENTAL VALUES:								
Composition of saturated solutions of KH_2PO_4 in water.								
<i>t</i> /°C.	in 1000 cm ³ mols	of solution grams	in 1000 g of mols	solution grams	in 1000 g of mols	water grams		
0	1.001	136.3	0.917	124.8	1.047	142.6		
15	1.359	185.0	1.233	167.8	1.481	201.7		
18	1.433	195.2	1.302	177.3	1.583	215.5		
25	1.699	231.3	1.474	200.7	1.845	251.2		
-2.75 ^a					1.08	147		
^a This is the cryohydric point of the system under consideration. However, the authors are in doubt about the accuracy of their analytical results.								
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:						
The apparatus was that described previously (1). The equilibrium was checked by repeated analysis. The H_2PO_4^- ion content was determined gravimetrically as ammonium phosphomolybdate.		Kahlbaum KH_2PO_4 was used. This material had been prepared for enzyme investigations.						
				ESTIMATED ERROR:				
				The temperature was controlled to ± 0.1 K. The accuracy of the cryohydric temperature was ± 0.01 K. No other information is given.				
				REFERENCES:				
				1. Menzel, H. <i>Z. Anorg. Allg. Chem.</i> , 1927, 164, 6.				

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Krasil'shtschikov, A.I. <i>Izv. In-ta Fiz-khim. An.</i> <u>1933</u> , 6, 159-68.
VARIABLES: Composition at 0, 25 and 50°C.	PREPARED BY: J. Eysseltová

EXPERIMENTAL VALUES:Composition of saturated solutions of KH_2PO_4 in water.

<i>t</i> /°C	<i>d</i> g cm ⁻³	conc ^a	K ₂ O conc ^b	conc ^c	conc ^a	P ₂ O ₅ conc ^b	conc ^c	H ₂ O conc ^c	mass% KH ₂ PO ₄	mol/kg ^d
0	1.094	9.44	4.39	39.85	9.44	6.62	60.15	808.2	12.68	1.06
25	1.147	15.9	6.89	39.85	15.9	10.40	60.15	478.5	19.90	1.82
50		25.8	10.09	39.85	25.8	15.22	60.15	295.1	29.15	3.02

^aThe concentration unit is: mol/1000 mol H_2O .^bThe concentration unit is: g/100 g of solution.^cThe concentration unit is: g/100 g of oxides.^dThese values were calculated by the compiler.**AUXILIARY INFORMATION****METHOD/APPARATUS/PROCEDURE:**

The mixtures were allowed to equilibrate for 12-15 hours in a water thermostat. Phosphorus was determined gravimetrically as $\text{Mg}_2\text{P}_2\text{O}_7$.

SOURCE AND PURITY OF MATERIALS:

Kahlbaum KH_2PO_4 was used.

ESTIMATED ERROR:

The temperature was controlled to within ± 0.1 K.

REFERENCES:

Potassium Dihydrogenphosphate

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Bergman, A.G.; Bochkarev, N.F. <i>Izv. Akad. Nauk SSSR</i> 1938, 237-65.
VARIABLES: Temperature and composition.		PREPARED BY: J. Eysseltova
EXPERIMENTAL VALUES:		
Composition and crystallization temperatures in the aqueous KH_2PO_4 system.		
KH_2PO_4 mass% mol/kg ^a		$t/^\circ\text{C}.$ solid phase
4 0.30 8 0.63 10 0.81 12 1.00 16 1.39 18 1.61 20 1.83 22 2.07		-0.7 ice -1.5 " -2.1 " 0.8 KH_2PO_4 13.6 " 19.8 " 26.0 " 31.8 "
^a The mol/kg H_2O values were calculated by the compiler.		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: No details are given except that a visual polythermic method was used.	SOURCE AND PURITY OF MATERIALS: Chemically pure KH_2PO_4 was recrystallized twice before being used.	
		ESTIMATED ERROR: No information is given.
		REFERENCES:

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Kazantsev, A.A. <i>Zh. Obshch. Khim.</i> <u>1938</u> , 13, 1230-1.
VARIABLES: Temperature and composition.	PREPARED BY: J. Eysseltova

EXPERIMENTAL VALUES:
 Composition of saturated solutions of KH_2PO_4 in water.

$t/\text{^{\circ}C.}$	mass% KH_2PO_4		
	calcd. ^a	exptl	mol/kg KH_2PO_4 ^b
0	12.79	12.88	1.086
5	14.05	14.00	1.196
10	15.46	15.50	1.347
15	16.93	16.87	1.491
20	18.46	18.45	1.662
25	20.09	20.04	1.841
30	21.77	21.90	2.060
35	23.51	23.65	2.275
40	25.31	25.10	2.462
45	27.17	26.90	2.703
50	29.07	29.00	3.001
60	33.01	33.40	3.684
70	37.10	37.05	4.324
80	41.29	41.30	5.169
90	45.53	45.5	6.134

^aThese values were calculated from the empirical formula:

$$a = 12.79 + 0.250 t + 0.00182 t^2 - 0.00000616 t^3$$

where a is given as g KH_2PO_4 /100 g soln, and t = temperature.

^bThese values were calculated by the compiler from the experimental results reported by the author.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: A small amount of solid salt was added to 10-15 ml of a solution saturated at a higher temperature. The mixtures were equilibrated in a thermostat. Equilibration times were 3 hours for temperatures above 30°C, and 6 hours for temperatures lower than 30°C. After equilibration, samples of the solution were analyzed for KH_2PO_4 by drying at 110°C and weighing.	SOURCE AND PURITY OF MATERIALS: KH_2PO_4 was synthesized from K_2CO_3 and H_3PO_4 and recrystallized. Its purity was said to be equivalent to "chemically pure".
	ESTIMATED ERROR: The temperature had a precision of $\pm 0.05^\circ\text{C}$. No other details are given.
	REFERENCES:

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Bel'tschev, F.V. <i>Trudy Beloruss. S.-Kh. Akad.</i> <u>1953</u> , 19, 145-9.																																								
VARIABLES: Temperature and composition.		PREPARED BY: J. Eyseltová																																								
EXPERIMENTAL VALUES: Composition and mean crystallization temperature in the aqueous KH_2PO_4 system.																																										
<table> <thead> <tr> <th>KH_2PO_4 mass%</th> <th>mol/kg^a</th> <th>$t/^\circ\text{C.}$</th> <th>solid phase</th> </tr> </thead> <tbody> <tr><td>4</td><td>0.30</td><td>-0.8</td><td>ice</td></tr> <tr><td>8</td><td>0.63</td><td>-1.6</td><td>"</td></tr> <tr><td>10</td><td>0.81</td><td>-2.0</td><td>"</td></tr> <tr><td>12</td><td>1.00</td><td>-0.2</td><td>"</td></tr> <tr><td>14</td><td>1.19</td><td>-7.8</td><td>"</td></tr> <tr><td>16</td><td>1.39</td><td>+14.1</td><td>KH_2PO_4</td></tr> <tr><td>18</td><td>1.61</td><td>+20.6</td><td>"</td></tr> <tr><td>20</td><td>1.83</td><td>+26.7</td><td>"</td></tr> <tr><td>22</td><td>2.07</td><td>+32.2</td><td>"</td></tr> </tbody> </table>			KH_2PO_4 mass%	mol/kg^a	$t/^\circ\text{C.}$	solid phase	4	0.30	-0.8	ice	8	0.63	-1.6	"	10	0.81	-2.0	"	12	1.00	-0.2	"	14	1.19	-7.8	"	16	1.39	+14.1	KH_2PO_4	18	1.61	+20.6	"	20	1.83	+26.7	"	22	2.07	+32.2	"
KH_2PO_4 mass%	mol/kg^a	$t/^\circ\text{C.}$	solid phase																																							
4	0.30	-0.8	ice																																							
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<p>^aThe mol/kg H_2O values were calculated by the compiler.</p>																																										
AUXILIARY INFORMATION																																										
METHOD/APPARATUS/PROCEDURE: A visual polythermic method (1) was used.. No other details are given.	SOURCE AND PURITY OF MATERIALS: Chemically pure KH_2PO_4 was recrystallized twice before use.																																									
ESTIMATED ERROR: No information is given.																																										
REFERENCES: 1. Bel'tschev, F.V.; Bergman, A.G. <i>Zh. Prikl. Khim.</i> <u>1944</u> , 17, 9.																																										

COMPONENTS: (1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Punin, Yu.O.; Mirenkova, T.F.; Artamanova, O.I.; Ul'yanova, T.P. <i>Zh. Neorg. Khim.</i> <u>1975</u> , 20, 2813-5.
VARIABLES: Temperature and composition.	PREPARED BY: J. Eyseltová
EXPERIMENTAL VALUES:	
<p>Parameters a_1 of the equation</p> $c_t = a_0 + a_1 t + a_2 t^2 + \dots + a_5 t^5$ $a_0 = 14.958$ $a_1 = 2.881 \times 10^{-1}$ $a_2 = 4.914 \times 10^{-3}$ $a_3 = 1.826 \times 10^{-5}$ $a_4 = 2.311 \times 10^{-7}$ $a_5 = 0$	
c_t = concentration of the saturated solution as g/100 g H_2O at the temperature, $t^\circ\text{C}$.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Mixtures of KH_2PO_4 and water were prepared by precise weighing. The saturation temperatures were measured by an apparatus constructed for the purpose of measuring the rate of crystal growth (1).	SOURCE AND PURITY OF MATERIALS: A special purity grade of KH_2PO_4 was used.
	ESTIMATED ERROR: No information is given.
	REFERENCES: <ol style="list-style-type: none"> Petrov, T.G.; Trejbis, E.B.; Kosatkin, A.P. "Vyrashchivanie kristallov iz rasvorov", Nedra, Leningrad, <u>1967</u>.

Potassium Dihydrogenphosphate

COMPONENTS:					ORIGINAL MEASUREMENTS:				
(1) Potassium dihydrogenphosphate; KH_2PO_4 ; [7778-77-0]					Muthmann, W.; Kuntze, O. Z. Kryst. 1894, 23, 368-76.				
(2) Potassium dihydrogenarsenate; KH_2AsO_4 ; [7784-41-0]									
(3) Water; H_2O ; [7732-18-5]									
VARIABLES:					PREPARED BY:				
Composition at 7°C.					J. Eysseltová				

EXPERIMENTAL VALUES:Composition of saturated solutions in the KH_2PO_4 - KH_2AsO_4 - H_2O system at 7°C.

d g cm ⁻³	concn. ^a	KH_2PO_4 ^b concn.	mass% ^c	mol/kg ^c	concn. ^a	KH_2AsO_4 ^b concn.	mass% ^c	mol/kg ^c	mass% ^c
1.1634	249.86	1834.9	21.48	2.00	----	----	0	0	78.52
1.1720	220.02	1615.4	18.77	1.76	37.60	208.7	3.20	0.22	78.01
1.1773	204.83	1504.3	17.39	1.64	59.84	332.1	5.08	0.36	77.51
1.1848	181.08	1329.8	15.28	1.45	92.10	511.3	7.77	0.56	76.94
1.1903	160.24	1176.8	13.46	1.29	120.80	670.6	10.14	0.73	76.38
1.1971	137.61	1010.6	11.49	1.11	151.39	840.4	13.64	0.92	75.85
1.2004	111.36	815.6	9.27	0.89	179.74	997.8	14.97	1.09	75.74
1.1999	80.89	594.7	6.74	0.65	205.69	1141.6	17.13	1.25	76.11
1.2000	51.09	375.2	4.25	0.41	234.05	1299.3	19.50	1.42	76.23
1.2009	29.17	214.2	2.42	0.23	256.20	1425.5	21.33	1.55	76.25
1.1955	----	----	0	0	282.37	1567.5	23.61	1.71	76.39

^aThe concentration unit is: g/1000 ml.^bThe concentration unit is: mg mol/1000 ml.^cThese values were calculated by the compiler.

COMMENT: The solid phases were solid solutions.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Cool saturated solutions were mixed in a volume ratio of 1:9, 2:8,..., 9:1. Solid components were added to the mixtures. The mixtures were then heated to dissolve the solid phase and placed in a cellar. Super-saturated solutions were formed and seeded with a residue obtained by evaporation of a drop of the respective solution. The contents of the pycnometers used for density measurements were evaporated and the residue was dried at 100°C in a dry box. The arsenic content of the residue was then determined gravimetrically as As_2S_5 .	No information is given.
	ESTIMATED ERROR:
	No details are given except that the temperature interval was 6.8 to 7.2°C.
	REFERENCES: