

COMPONENTS: (1) Disodium hydrogenphosphate; Na_2HPO_4 ; [7558-79-4] (2) Diammonium hydrogenphosphate; $(\text{NH}_4)_2\text{HPO}_4$; [7783-28-0] (3) Sodium chloride; NaCl ; [7647-14-5] (4) Ammonium chloride; NH_4Cl ; [12125-02-9] (5) Water; H_2O ; [7732-18-5]					ORIGINAL MEASUREMENTS: Lauffenburger, R.; Brodsky, N. <i>Compt. Rend.</i> 1938, 206, 1383-5.				
VARIABLES: Composition and temperature.					PREPARED BY: J. Eysseltová				
EXPERIMENTAL VALUES: Part 1. Composition of the solutions saturated simultaneously by two solids in the $2 \text{Na}^+, 2 \text{NH}_4^+ \text{HPO}_4^{2-}, 2 \text{Cl}^- \cdot \text{H}_2\text{O}$ system.									
	Na_2HPO_4		$(\text{NH}_4)_2\text{HPO}_4$		NaCl		NH_4Cl		solid _b phase
<i>t</i> /°C.	mass% ^a	mol/kg	mass% ^a	mol/kg	mass% ^a	mol/kg	mass% ^a	mol/kg	
0	----	----	----	----	9.96	4.89	10.20	2.73	C + D
25	----	----	----	----	17.61	4.41	14.07	3.85	"
0	----	----	25.58	3.47	-----	-----	18.58	6.22	B + D
25	----	----	12.97	1.53	-----	-----	22.84	6.65	"
0	0.80	0.08	29.08	3.14	-----	-----	-----	-----	B + E
25	1.17	0.14	39.96	5.14	-----	-----	-----	-----	"
0	3.23	0.25	5.77	0.48	-----	-----	-----	-----	A + E
25	11.90	1.00	3.68	0.33	-----	-----	-----	-----	"
0	9.54	1.00	-----	-----	23.39	5.95	-----	-----	A + C
25	5.06	0.50	-----	-----	23.72	5.70	-----	-----	"
(continued next page)									
AUXILIARY INFORMATION									
METHOD/APPARATUS/PROCEDURE: The isothermal method was used. Four days were allowed for equilibration. Phosphate, chloride and ammonia were analyzed. Sodium and water were determined by difference.					SOURCE AND PURITY OF MATERIALS: All materials were "pur." grade.				
					ESTIMATED ERROR: The temperature was constant to within ± 0.05 K.				
					REFERENCES:				

COMPONENTS:					ORIGINAL MEASUREMENTS:				
(1) Disodium hydrogenphosphate; Na_2HPO_4 ; [7558-79-4]					Lauffenburger, R.; Brodsky, N.				
(2) Diammonium hydrogenphosphate; $(\text{NH}_4)_2\text{HPO}_4$; [7783-28-0]					Compt. Rend. 1938, 206, 1383-5.				
(3) Sodium chloride; NaCl ; [7647-14-5]									
(4) Ammonium chloride; NH_4Cl ; [12125-02-9]									
(5) Water; H_2O ; [7732-18-5]									
EXPERIMENTAL VALUES cont'd:									
Part 2. Composition of solutions saturated simultaneously by three solid phases in the 2Na^+ , $2 \text{NH}_4^+ \text{HPO}_4^{2-}$, $2 \text{Cl}^- - \text{H}_2\text{O}$ system.									
$t/^\circ\text{C}$.	Na^+		NH_4^+		HPO_4^{2-}		Cl^-		solid phases ^b
	mass% ^a	mol/kg	mass% ^a	mol/kg	mass% ^a	mol/kg	mass% ^a	mol/kg	
0	7.83	4.90	3.32	2.80	0.53	0.08	18.65	7.55	C + D + E
25	6.62	4.34	5.28	4.67	1.47	0.23	20.15	8.55	"
25	10.57	6.51	0.48	0.40	3.12	0.46	15.03	5.99	A + C + E
0	0.43	0.30	10.64	10.1	15.76	2.65	11.20	5.1	B + C + E
25	0.67	0.45	9.97	9.04	10.21	1.64	14.28	6.21	"
^a These values were calculated by the compiler.									
^b The solid phases are: A = Na_2HPO_4 ; B = $(\text{NH}_4)_2\text{HPO}_4$; C = NaCl ; D = NH_4Cl ;									
E = $\text{NH}_4\text{NaHPO}_4 \cdot 4\text{H}_2\text{O}$.									

COMPONENTS: (1) Disodium hydrogenphosphate; Na_2HPO_4 ; [7558-79-4] (2) Sodium chloride; NaCl ; [7647-14-5] (3) Sodium nitrate; NaNO_3 ; [7631-99-4] (4) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Makin, A.V. <i>Zh. Neorg. Khim.</i> 1958, 3, 2764-6.																																																																																																																																											
VARIABLES: Composition at 25°C.	PREPARED BY: J. Eysseltová																																																																																																																																											
EXPERIMENTAL VALUES: Points of simultaneous crystallization of two or three solid phases in the NaNO_3 - Na_2HPO_4 - NaCl - H_2O system at 25°C. <table border="1" data-bbox="257 547 1004 1071"> <thead> <tr> <th colspan="2">NaNO_3^a</th> <th colspan="2">Na_2HPO_4</th> <th colspan="2">NaCl^a</th> <th rowspan="2">solid phases^c</th> </tr> <tr> <th>mass%</th> <th>conc^b</th> <th>mass%</th> <th>conc^b</th> <th>mass%</th> <th>conc^b</th> </tr> </thead> <tbody> <tr><td>20.32</td><td>68.00</td><td>9.17</td><td>31.10</td><td>----</td><td>----</td><td>A + B</td></tr> <tr><td>18.17</td><td>54.72</td><td>7.93</td><td>23.80</td><td>7.10</td><td>21.48</td><td>"</td></tr> <tr><td>17.21</td><td>48.64</td><td>7.70</td><td>21.90</td><td>10.47</td><td>29.46</td><td>"</td></tr> <tr><td>14.85</td><td>40.36</td><td>7.18</td><td>19.48</td><td>14.80</td><td>40.16</td><td>"</td></tr> <tr><td>13.20</td><td>35.44</td><td>6.63</td><td>17.82</td><td>17.42</td><td>46.74</td><td>"</td></tr> <tr><td>11.43</td><td>29.52</td><td>6.26</td><td>16.20</td><td>21.04</td><td>54.28</td><td>"</td></tr> <tr><td>9.61</td><td>23.97</td><td>5.73</td><td>14.28</td><td>24.78</td><td>61.75</td><td>"</td></tr> <tr><td>8.05</td><td>19.30</td><td>5.66</td><td>13.59</td><td>27.97</td><td>67.11</td><td>A + B + C</td></tr> <tr><td>-----</td><td>-----</td><td>6.34</td><td>19.60</td><td>26.05</td><td>80.40</td><td>B + C</td></tr> <tr><td>1.95</td><td>5.32</td><td>5.95</td><td>17.18</td><td>27.30</td><td>77.50</td><td>"</td></tr> <tr><td>3.70</td><td>8.28</td><td>5.81</td><td>16.42</td><td>27.91</td><td>75.30</td><td>"</td></tr> <tr><td>5.81</td><td>13.80</td><td>5.71</td><td>14.78</td><td>28.10</td><td>71.42</td><td>"</td></tr> <tr><td>8.05</td><td>19.30</td><td>5.64</td><td>13.61</td><td>27.99</td><td>67.07</td><td>A + B + C</td></tr> <tr><td>12.31</td><td>28.75</td><td>-----</td><td>-----</td><td>30.51</td><td>71.25</td><td>A + C</td></tr> <tr><td>10.50</td><td>24.61</td><td>1.78</td><td>4.18</td><td>30.38</td><td>71.21</td><td>"</td></tr> <tr><td>9.33</td><td>22.10</td><td>2.90</td><td>6.89</td><td>29.98</td><td>71.01</td><td>"</td></tr> <tr><td>8.47</td><td>19.80</td><td>4.71</td><td>10.30</td><td>28.70</td><td>69.90</td><td>"</td></tr> <tr><td>8.05</td><td>19.30</td><td>5.63</td><td>13.57</td><td>27.94</td><td>67.13</td><td>A + B + C</td></tr> </tbody> </table> <p>^aThese are probably incorrect headings--see the critical evaluation. ^bThe concentration units are: mol/100 mol of solute. ^cThe solid phases are: A = NaCl; B = $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$; C = NaNO_3.</p>		NaNO_3^a		Na_2HPO_4		NaCl^a		solid phases ^c	mass%	conc ^b	mass%	conc ^b	mass%	conc ^b	20.32	68.00	9.17	31.10	----	----	A + B	18.17	54.72	7.93	23.80	7.10	21.48	"	17.21	48.64	7.70	21.90	10.47	29.46	"	14.85	40.36	7.18	19.48	14.80	40.16	"	13.20	35.44	6.63	17.82	17.42	46.74	"	11.43	29.52	6.26	16.20	21.04	54.28	"	9.61	23.97	5.73	14.28	24.78	61.75	"	8.05	19.30	5.66	13.59	27.97	67.11	A + B + C	-----	-----	6.34	19.60	26.05	80.40	B + C	1.95	5.32	5.95	17.18	27.30	77.50	"	3.70	8.28	5.81	16.42	27.91	75.30	"	5.81	13.80	5.71	14.78	28.10	71.42	"	8.05	19.30	5.64	13.61	27.99	67.07	A + B + C	12.31	28.75	-----	-----	30.51	71.25	A + C	10.50	24.61	1.78	4.18	30.38	71.21	"	9.33	22.10	2.90	6.89	29.98	71.01	"	8.47	19.80	4.71	10.30	28.70	69.90	"	8.05	19.30	5.63	13.57	27.94	67.13	A + B + C
NaNO_3^a		Na_2HPO_4		NaCl^a		solid phases ^c																																																																																																																																						
mass%	conc ^b	mass%	conc ^b	mass%	conc ^b																																																																																																																																							
20.32	68.00	9.17	31.10	----	----	A + B																																																																																																																																						
18.17	54.72	7.93	23.80	7.10	21.48	"																																																																																																																																						
17.21	48.64	7.70	21.90	10.47	29.46	"																																																																																																																																						
14.85	40.36	7.18	19.48	14.80	40.16	"																																																																																																																																						
13.20	35.44	6.63	17.82	17.42	46.74	"																																																																																																																																						
11.43	29.52	6.26	16.20	21.04	54.28	"																																																																																																																																						
9.61	23.97	5.73	14.28	24.78	61.75	"																																																																																																																																						
8.05	19.30	5.66	13.59	27.97	67.11	A + B + C																																																																																																																																						
-----	-----	6.34	19.60	26.05	80.40	B + C																																																																																																																																						
1.95	5.32	5.95	17.18	27.30	77.50	"																																																																																																																																						
3.70	8.28	5.81	16.42	27.91	75.30	"																																																																																																																																						
5.81	13.80	5.71	14.78	28.10	71.42	"																																																																																																																																						
8.05	19.30	5.64	13.61	27.99	67.07	A + B + C																																																																																																																																						
12.31	28.75	-----	-----	30.51	71.25	A + C																																																																																																																																						
10.50	24.61	1.78	4.18	30.38	71.21	"																																																																																																																																						
9.33	22.10	2.90	6.89	29.98	71.01	"																																																																																																																																						
8.47	19.80	4.71	10.30	28.70	69.90	"																																																																																																																																						
8.05	19.30	5.63	13.57	27.94	67.13	A + B + C																																																																																																																																						
AUXILIARY INFORMATION																																																																																																																																												
METHOD/APPARATUS/PROCEDURE: The method of invariant points was used. To a solution saturated with two salts, a third salt was added until ternary eutonic equilibrium was reached. Analyses were made gravimetrically: the hydrogenphosphate ion was precipitated as NH_4MgPO_4 ; sodium was precipitated as sodium zinc uranylacetate after removing the phosphate. The nitrate ion content was determined by difference.	SOURCE AND PURITY OF MATERIALS: No details are given. ESTIMATED ERROR: No details are given. The compiler considers the reproducibility to be about $\pm 0.1\%$. REFERENCES:																																																																																																																																											

COMPONENTS: (1) Disodium hydrogenphosphate; Na_2HPO_4 ; [7558-79-4] (2) Disodium sulfate; Na_2SO_4 ; [7757-82-6] (3) Sodium nitrate; NaNO_3 ; [7631-99-4] (4) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Makin, A.V.; Lepeshkov, I.N. <i>Zh. Neorg. Khim.</i> 1964, 9, 495-8.						
VARIABLES: Composition at 25°C.		PREPARED BY: J. Eysseltová						
EXPERIMENTAL VALUES: Part 1. Points of simultaneous crystallization of two or three solid phases in the NaNO_3 - Na_2HPO_4 - Na_2SO_4 - H_2O system at 25°C.								
soln. no.	Na_2SO_4		Na_2HPO_4		NaNO_3		H_2O	solid phase ^b
	mass%	mol% ^a	mass%	mol% ^a	mass%	mol% ^a	mol% ^a	
1	15.07	66.72	7.52	33.28	----	----	2767.3	A + B
2	14.03	54.40	6.92	26.81	2.85	18.79	2325.8	"
3	13.54	48.19	6.90	24.54	4.56	27.27	2104.8	"
4	13.39	45.12	6.86	23.16	5.65	31.72	1969.9	"
5	12.32	36.13	6.83	19.99	8.95	43.88	1662.5	"
6	12.35	32.48	6.63	17.44	11.52	50.08	1234.5	"
7	12.02	28.47	6.49	15.29	14.29	56.24	1248.9	"
8	10.96	23.49	6.07	13.07	17.67	63.44	1106.7	A + B + C
9	10.06	20.67	6.04	10.91	20.50	68.42	1027.3	" ^c
10	8.84	16.53	5.50	10.26	23.46	73.21	901.9	" ^c
11	6.53	12.05	4.55	8.41	27.52	79.54	905.1	"
12	5.25	8.95	4.10	6.97	29.65	84.08	817.2	"
13	4.99	7.96	3.76	6.01	32.35	86.03	742.0	A + C + D
14	14.94	28.67	----	----	22.24	71.33	952.6	B + C
15	13.98	27.45	1.25	2.45	21.39	70.10	980.5	"
16	13.99	27.57	2.72	5.36	20.37	67.07	950.4	"
17	11.81	24.9	4.00	8.16	19.88	67.75	1035.0	"
18	11.28	23.8	5.43	11.46	18.37	64.74	1080.5	"
19	11.22	23.87	5.65	12.03	18.09	64.10	1093.0	"
20	10.99	23.61	6.04	12.97	17.67	63.42	1106.7	A + B + C
21	5.02	6.42	----	----	43.75	93.58	517.5	C + D
22	5.01	7.12	1.83	2.60	37.96	90.28	619.9	"
23	5.04	7.58	3.06	4.59	34.96	87.83	677.7	"
(continued next page)								
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE: The method of invariant points was used. At least 6 days were allowed for equilibration. All analyses were done gravimetrically; phosphate was determined as $\text{NH}_4\text{MgPO}_4 \cdot 6\text{H}_2\text{O}$; sulfate as BaSO_4 ; sodium as zinc uranylacetate. Water and nitrate contents were determined by difference.					SOURCE AND PURITY OF MATERIALS: No information is given.			
					ESTIMATED ERROR: No information is given.			
					REFERENCES:			

COMPONENTS:

- (1) Disodium hydrogenphosphate; Na_2HPO_4 ; [7558-79-4]
 (2) Disodium sulfate; Na_2SO_4 ; [7757-82-6]
 (3) Sodium nitrate; NaNO_3 ; [7631-99-4]
 (4) Water; H_2O ; [7732-18-5]

ORIGINAL MEASUREMENTS:

Makin, A.V.; Lepeshkov, I.N.
Zh. Neorg. Khim. 1964, 9, 495-8.

EXPERIMENTAL VALUES cont'd:

Part 1. Points of simultaneous crystallization of two or three solid phases in the NaNO_3 - Na_2HPO_4 - Na_2SO_4 - H_2O system at 25°C.

soln. no.	Na_2SO_4		Na_2HPO_4		NaNO_3		H_2O	solid phase ^b
	mass%	mol% ^a	mass%	mol% ^a	mass%	mol% ^a	mol% ^a	
24	4.99	7.96	3.76	6.01	32.35	86.03	742.0	A + C + D
25	----	----	6.34	12.76	26.05	87.24	1089.1	A + D
26	1.39	2.44	5.74	10.06	29.87	87.50	871.5	"
27	3.19	5.25	5.05	8.52	30.88	86.23	803.0	"
28	4.22	6.94	4.46	7.31	31.20	85.72	780.0	"
29	4.99	7.96	3.76	6.01	32.35	86.03	742.0	A + C + D

^aThis should be: mol/100 mol of solute--compiler.

^bThe solid phases are: A = $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$; B = $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$;

C = $\text{NaNO}_3 \cdot \text{Na}_2\text{SO}_4 \cdot \text{H}_2\text{O}$; D = NaNO_3 .

^cThis is an obvious error: the compiler suggests that the correct phases are A + C.

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

soln. no.	Na_2SO_4 mol/kg	Na_2HPO_4 mol/kg	NaNO_3 mol/kg	H_2O mass%
1	1.37	0.68	----	77.41
2	1.30	0.64	0.44	76.20
3	1.25	0.64	0.71	75.15
4	1.27	0.65	0.90	74.10
5	1.21	0.67	1.46	71.90
6	1.25	0.67	1.95	69.50
7	1.26	0.68	2.50	67.20
8	1.18	0.65	3.18	65.30
9	1.12	0.67	3.80	63.40
10	1.00	0.62	4.44	62.20
11	0.75	0.52	5.27	61.40
12	0.60	0.47	5.72	61.00
13	0.60	0.45	6.46	58.90
14	1.67	----	4.16	62.82
15	1.55	0.14	3.97	63.38
16	1.56	0.30	3.81	62.92
17	1.29	0.44	3.64	64.31
18	1.22	0.59	3.33	64.92
19	1.21	0.61	3.27	65.04
20	1.18	0.65	3.18	65.30
21	0.69	----	10.05	51.23
22	0.64	0.23	8.09	55.20
23	0.62	0.38	7.22	56.94
24	0.60	0.45	6.46	58.90
25	----	0.66	4.53	67.61
26	0.16	0.64	5.58	63.00
27	0.37	0.58	5.97	60.88
28	0.49	0.52	6.10	60.12
29	0.60	0.45	6.46	58.90