COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromate; $NaBrO_3$; [7789-38-0] (2) Disodium (I-4)-tetroxomolybdate (2-) (sodium molybdate); Na_2MoO_4; [7631-95-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E.; Linke, W.F. *J. Am. Chem. Soc.* 1947, *69*, 1080-3.
VARIABLES: Composition at 298.15° K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 25.0°C

Sodium Molybdate mass %	Sodium Molybdate mol % (compiler)	Sodium Bromate mass %	Sodium Bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
39.38	5.378	0.00	0.00	1.432	A
38.30	5.280	1.80	0.339	1.442	"
37.09	5.171	3.86	0.734	1.453	"
35.57	5.022	6.33	1.22	1.466	A+B
35.58	5.021	6.29	1.21	1.468	"
35.60	5.025	6.28	1.21	1.470	"
(Av) 35.58	5.022	6.30	1.21	1.468	"
32.64	4.489	7.49	1.41	1.440	B
27.53	3.639	9.86	1.78	1.398	"
22.44	2.868	12.56	2.190	1.363	"
16.18	1.998	16.35	2.756	1.326	"
11.47	1.385	19.40	3.197	1.304	"
4.85	0.573	24.42	3.936	1.278	"
0.00	0.000	28.29[b]	4.498	1.264	

[a] A = $Na_2MoO_4.2H_2O$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.614 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Isothermal method. Saturated solutions were prepared by stirring complexes of known compositions. Aliquots of saturated solution for analyses were withdrawn with calibrated pipets fitted with filters at the tips.

Bromate content in the saturated solutions was determined iodometrically. In the presence of molybdate, a slight excess of aqueous HCl solution was required to obtain the correct end-point within the short titration time.

The total salt content of liquid and solid samples was determined by evaporation and drying to constant weight.

COMMENTS AND/OR ADDITIONAL DATA:

The phase diagram for this ternary system is given (superimposed) on the phase diagram for the Na_2MoO_4-$NaIO_3$-H_2O system (see the compilation for this latter system).

SOURCE AND PURITY OF MATERIALS:

C.p. grade sodium molybdate dihydrate was used. The salt was completely dehydrated at 180°C, and stored at 150°C. The purity of this anhydrous salt was found to be 100.0 %.

C.p. grade sodium bromate used and was found to be pure within 1/1000.

ESTIMATED ERROR:

Soly: the accuracy of titration was within 0.1 %.

Temp: precision ± 0.04 K.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium carbonate; Na_2CO_3; [497-19-8]	Klebanov, G.S.; Basova, E.P.
(2) Sodium bromate; $NaBrO_3$; [7789-38-0]	*Zh. Prikl. Khim.* 1939, *12*, 1601-9.
(3) Water; H_2O; [7732-18-5]	
VARIABLES:	**PREPARED BY:**
Composition at 353 K	Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 90°C

Sodium Bromate		Sodium Carbonate		Nature of the solid phase[a]
mass %	mol % (compiler)	mass %	mol % (compiler)	
42.51[b]	8.112	-	-	A
36.58	6.895	5.36	1.44	"
28.10	5.171	12.50	3.275	"
21.88	4.013	18.84	4.919	A+B
15.51	2.740	22.60	5.684	B
8.65	1.45	25.75	6.164	"
-	-	30.95	7.079	"

[a] A = $NaBrO_3$; B = $Na_2CO_3.H_2O$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 4.900 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The isothermal method was used. Prior to the experiment the carbon dioxide content in solution was checked by phenolphthalein. The salt and water were placed into a tube equipped with a stirrer, and the tube placed in a water thermostat. A layer of paraffin placed on the surface of water in the thermostat at 80°C. Equilibrium was reached in a day. The sodium bromate content was determined iodometrically by titration with 0.1 mol dm^{-3} thiosulfate solution. The sodium carbonate was titrated with 0.1 mol dm^{-3} HCl.

The composition of the solid phase was identified by Schreinemakers' method, and by crystal optics.

SOURCE AND PURITY OF MATERIALS:

Chemically pure grade sodium carbonate was used without further purification. Sodium bromate was prepared as follows: (1) The salt was synthesized by the following reaction: $Br_2 + 5Cl_2 + 12NaOH = 2NaBrO_3 + 10NaCl + 6H_2O$. (2) $KBrO_3$ was reacted with $BaCl_2$. The $Ba(BrO_3)_2$ obtained was treated with Na_2SO_4. The pptd $BaSO_4$ was removed by filtration and $NaBrO_3$ crystallized from the filtrate. The product was recryst to remove foreign ions.

ESTIMATED ERROR:

Nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromate; $NaBrO_3$; [7789-38-0] (2) Sodium hydrogen carbonate; $NaHCO_3$; [144-55-8] (3) Water; H_2O; [7732-18-5]	Klebanov, G.S.; Basova, F.P. *Zh. Prikl. Khim.* 1939, *12*, 1601-9.
VARIABLES: T/K = 298 and 308 Composition	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions

t/°C	Sodium Bromate mass %	Sodium Bromate mol % (compiler)	Sodium Hydrogen Carbonate mass %	Sodium Hydrogen Carbonate mol % (compiler)	Nature of the solid phase[a]
25	28.14[b]	4.466	-	-	A
	25.94	4.089	1.80	0.510	"
	24.34	3.884	4.76	1.36	A+B
	18.47	2.760	4.90	1.32	B
	12.24	1.732	6.18	1.57	"
	6.98	0.948	7.55	1.84	"
	-	-	9.34	2.16	"
35	31.95[b]	5.308	-	-	A
	29.00	4.757	2.13	0.628	"
	28.02	4.679	4.88	1.46	A+B
	23.25	3.673	5.02	1.42	B
	17.88	2.683	5.98	1.61	"
	11.90	1.697	7.40	1.90	"
	7.86	1.08	8.20	2.03	"
	6.26	0.855	8.96	2.20	"
	-	-	10.55	2.467	"

[a] A = $NaBrO_3$; B = $NaHCO_3$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.595 mol kg^{-1} at 25°C
= 3.112 mol kg^{-1} at 35°C

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The isothermal method was used. The salt and water were placed into a tube equipped with a stirrer, and the tube placed in a water thermostat at 25 or 35°C. Equilibrium was reached in a day. The sodium bromate content was determined iodometrically by titration with 0.1 mol dm^{-3} thiosulfate solution. The sodium hydrogen carbonate content was determined by titration with 0.1 mol dm^{-3} hydrochloric acid using methyl orange indicator. The composition of the solid phase was determined by Schreinemakers' method, and by crystal-optics.

SOURCE AND PURITY OF MATERIALS:

Chemically pure grade $NaHCO_3$ was used without further purification. Sodium bromate was prepd as follows: (1) The salt was synthesized by the following reaction: $Br_2 + 5Cl_2 + 12NaOH = 2NaBrO_3 + 10NaCl + 6H_2O$. (2) $KBrO_3$ was reacted with $BaCl_2$, and the $Ba(BrO_3)_2$ obtnd was treated with Na_2SO_4. The pptd $BaSO_4$ was removed by filtration and $NaBrO_3$ crystallized from the filtrate. The product was recryst to remove foreign ions.

ESTIMATED ERROR:

Nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium nitrate; $NaNO_3$; [7631-99-4] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1934, *56*, 299-303.
VARIABLES: Composition at 298.15 K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 25°C

Sodium Nitrate mass %	Sodium Nitrate mol % (compiler)	Sodium Bromate mass %	Sodium Bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
47.87	16.29	0.00	0.00	1.384	A
46.50	16.10	2.43	0.474	1.405	"
44.46	15.80	6.04	1.21	1.432	"
42.57	15.51	9.39	1.93	1.455	A+B
42.60	15.52	9.37	1.92	1.455	"
(Av) 42.59	15.52	9.38	1.92	1.455	"
39.57	14.02	10.23	2.042	1.441	B
32.54	10.87	12.41	2.336	1.387	"
25.54	8.114	14.94	2.674	1.353	"
18.48	5.614	17.79	3.044	1.314	"
11.33	3.319	21.25	3.506	1.288	"
5.00	1.43	24.92	4.014	1.270	"
0.00	0.00	28.29[b]	4.498	1.257	"

[a] A = $NaNO_3$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.614 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts: these complexes were rotated in a large thermostat for about two days, a time found to be sufficient for attaining equilibrium.
Samples of the saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. Sodium nitrate was found by difference.
For the determination of solid phase compositions, the method of algebraic extrapolation of tie-lineswas used.

SOURCE AND PURITY OF MATERIALS:

C.p. grade salts were recrystallized, dried to the anhydrous state, and kept constantly in a 100°C oven.

ESTIMATED ERROR:

Soly: accuracy within 0.2 %.
Temp: precision ± 0.01 K.
Densities: precision about 0.1 %.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium sulfate; Na_2SO_4; [7757-82-6] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1934, *56*, 299-303.
VARIABLES: Composition at 298.15 K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 25°C

Sodium sulfate mass %	Sodium sulfate mol % (compiler)	Sodium bromate mass %	Sodium bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
21.90	3.434	0.00	0.00	1.205	A
20.48	3.281	3.34	0.504	1.225	"
19.17	3.156	7.06	1.094	1.254	"
17.94	3.041	10.79	1.721	1.275	"
16.94	2.952	14.11	2.315	1.303	"
16.46	2.914	15.87	2.644	1.319	A+B
16.43	2.907	15.86	2.641	1.316	"
16.47	2.914	15.83	2.637	1.320	"
16.45	2.911	15.85	2.640	1.312	"
(Av)16.45	2.911	15.85	2.640	1.317	"
12.35	2.153	18.71	3.071	1.303	B
8.28	1.436	21.72	3.521	1.288	"
4.09	0.697	24.96	4.003	1.284	"
0.00	0.00	28.29[b]	4.498	1.257	"

[a] A = $Na_2SO_4.10H_2O$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.614 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts: these complexes were rotated in a large thermostat for about two days, a time found to be sufficient for attaining equilibrium.
Samples of the saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. Potassium sulfate was found by difference.
For the determination of solid phase compositions, the method of algebraic extrapolation of tie-line was used.

SOURCE AND PURITY OF MATERIALS:

C.p. grade salts were recrystallized, dried to the anhydrous state, and kept constantly in a 100°C oven.

ESTIMATED ERROR:

Soly: accuracy within 0.2 %.
Temp: precision ± 0.01 K.
Densities: precision about 0.1 %.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium sulfate; Na_2SO_4; [7757-82-6] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1935, 57, 805-10.
VARIABLES: T/K = 283 - 325 Composition	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions

t/°C	Sodium Sulfate mass %	Sodium Sulfate mol % (compiler)	Sodium Bromate mass %	Sodium Bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
10	8.26	1.13	0.00	0.00	1.079	A
	6.96	0.990	5.40	0.723	1.112	"
	5.20	0.795	14.21	2.045	1.175	"
	4.41	0.712	19.93	3.027	1.230	"
	4.41	0.713	20.10	3.059	1.228	A+C
	4.37	0.706	20.12	3.061	1.228	"
	(Av)4.40	0.711	20.11	3.061	1.227	"
	3.61	0.582	20.67	3.138	1.226	C
	1.83	0.294	21.96	3.316	1.217	"
	0.00	0.00	23.24	3.489	1.211	"
30	29.14	4.958	0.00	0.00	1.286	A
	26.92	4.747	5.18	0.860	1.312	"
	26.02	4.690	7.85	1.33	1.333	"
	25.28	4.665	10.43	1.812	1.351	"
	24.95	4.646	11.46	2.008	1.361	A+C
	25.03	4.659	11.36	1.990	1.364	"
	(Av)25.02	4.658	11.38	1.994	1.362	"
	21.04	3.844	13.86	2.384	1.343	C
	12.43	2.201	19.89	3.315	1.311	"
	0.00	0.00	29.85[b]	4.835	1.284	"

continued....

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts; these complexes were rotated in a large thermostat. Two weeks of stirring were required for attaining equilibrium. Samples of the saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate content was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. Na_2SO_4 was found by difference.

For the determination of solid phase compositions, the method of algebraic extrapolation of tie-lines was used.

SOURCE AND PURITY OF MATERIALS:

C.p. grade sodium sulfate and sodium bromate were recrystallized and dried to the anhydrous state, and then kept constantly in a 100°C oven.

ESTIMATED ERROR:

Soly: accuracy probably about 0.2% as in (1).
Temp: precision probably ± 0.01 K as in (1).

REFERENCES:

1. Ricci, J.E. *J. Am. Chem. Soc.* 1934, 56, 249.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium sulfate; Na_2SO_4; [7757-82-6]	Ricci, J.E.
(2) Sodium bromate; $NaBrO_3$; [7789-38-0]	*J. Am. Chem. Soc.* 1935, 57, 805-10.
(3) Water; H_2O; [7732-18-5]	

EXPERIMENTAL VALUES: (Continued)

Composition of saturated solutions

t/°C	Sodium Sulfate mass %	Sodium Sulfate mol % (compiler)	Sodium Bromate mass %	Sodium Bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
37.5	32.70	5.805	0.00	0.00	-	B
	31.20	5.643	2.99	0.509	-	"
	30.68	5.639	4.77	0.825	-	"
	30.53	5.658	5.57	0.972	-	"
	(30.4)	5.63	(5.7)	0.99	-	B+C
	30.36	5.631	5.80	1.01	-	S
	29.56	5.464	6.33	1.10	-	"
	28.04	5.184	7.85	1.37	-	"
	26.45	4.916	9.83	1.72	-	"
	25.11	4.704	11.78	2.077	-	"
	24.08	4.546	13.38	2.377	-	S+C
	24.18	4.566	13.31	2.366	-	"
	(Av) 24.14	4.559	13.35	2.373	-	"
	25.67	4.883	12.39	2.219		C(m)
	25.01	4.739	12.75	2.274	-	"
	24.71	4.677	12.95	2.307	-	"
	23.01	4.325	14.11	2.496	-	C
	15.28	2.793	19.61	3.374	-	"
	0.00	0.00	(32.08)[c]	5.338	-	"
45	32.07	5.650	0.00	0.00	-	B
	30.35	5.441	3.12	0.526	-	"
	29.18	5.321	5.64	0.968	-	"
	28.82	5.275	6.29	1.08	-	B+S
	28.79	5.268	6.30	1.09	-	"
	28.74	5.261	6.37	1.10	-	"
	(Av) 28.78	5.267	6.32	1.09	-	"
	30.44	5.559	4.50	0.774	-	S(m)
	29.95	5.471	5.01	0.861	-	"
	29.52	5.393	5.45	0.937	-	"
	29.21	5.343	5.85	1.01	-	"
	27.76	5.093	7.53	1.30	-	S
	26.56	4.905	9.23	1.60	-	"
	25.85	4.785	10.12	1.763	-	"
	24.18	4.522	12.56	2.211	-	"
	22.92	4.318	14.38	2.550	-	"
	22.77	4.297	14.65	2.602	-	"
	21.58	4.079	15.96	2.840	-	"
	20.94	3.979	17.00	3.041	-	"
	20.76	3.947	17.22	3.082	-	S+C
	20.90	3.978	17.15	3.072	-	"
	(Av) 20.86	3.969	17.17	3.075	-	"
	22.47	4.299	16.00	2.882	-	C(m)
	22.19	4.243	16.23	2.921	-	"
	21.59	4.117	16.62	2.983	-	"
	21.09	4.017	17.03	3.053	-	"
	19.81	3.755	17.93	3.199	-	C
	16.54	3.103	20.38	3.599	-	"
	8.10	1.49	27.14	4.694	-	"
	0.00	0.00	34.22[b]	5.848	-	"

continued.....

[c] Extrapolated value.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium sulfate; Na_2SO_4; [7757-82-6]	Ricci, J.E.
(2) Sodium bromate; $NaBrO_3$; [7789-38-0]	*J. Am. Chem. Soc.* 1935, 57, 805-10.
(3) Water; H_2O; [7732-18-5]	

EXPERIMENTAL VALUES: (Continued)

Composition of Saturated Solutions

t/°C	Sodium Sulfate mass %	Sodium Sulfate mol %	Sodium Bromate mass %	Sodium Bromate mol %	Density g cm^{-3}	Nature of the solid phase[a]
52	31.47	5.504	0.00	0.00	-	B
	29.71	5.279	3.03	0.507	-	"
	28.17	5.062	5.47	0.925	-	"
	27.73	5.064	7.19	1.24	-	B+S
	27.64	5.059	7.45	1.28	-	"
	(Av) 27.7	5.06	7.3	1.3	-	"
	26.03	4.776	9.24	1.60	-	S
	23.17	4.315	13.24	2.321	-	"
	21.39	4.033	15.96	2.833	-	"
	19.26	3.675	18.98	3.409	-	"
	18.12	3.490	20.80	3.771	-	S+C
	18.15	3.492	20.69	3.747	-	"
	(Av) 18.13	3.490	20.77	3.764	-	"
	19.60	3.789	19.61	3.568	-	C(m)
	19.03	3.673	20.06	3.644	-	"
	16.27	3.115	22.19	3.999	-	C
	8.62	1.623	28.49	5.048	-	"
	0.00	0.00	36.09 [b]	6.316	-	"

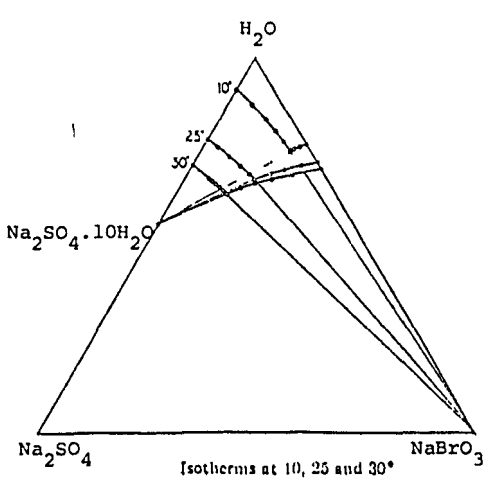
[a] A = $Na_2SO_4.10H_2O$; B = Na_2SO_4; C = $NaBrO_3$; S = solid solution

[b] For the binary system the compiler computes the following:

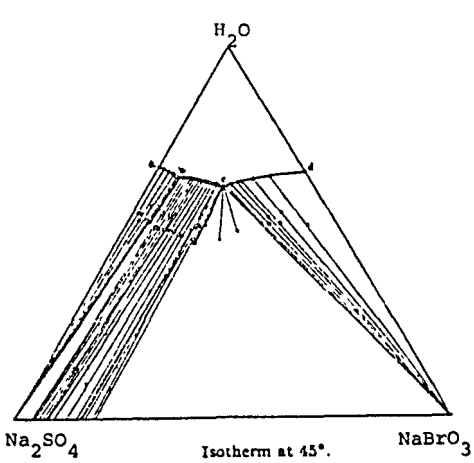
soly of $NaBrO_3$ = 2.006 mol kg^{-1} at 10°C
= 2.820 mol kg^{-1} at 30°C
= 3.130 mol kg^{-1} at 37.5°C
= 3.448 mol kg^{-1} at 45°C
= 3.742 mol kg^{-1} at 52°C

COMMENTS AND/OR ADDITIONAL DATA:

The phase diagrams are given below (based on mass % units).



Isotherms at 10, 25 and 30°



Isotherm at 45°.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium chloride; NaCl; [7647-14-1] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1934, *56*, 299-303.
VARIABLES:	**PREPARED BY:**
Composition at 283.15 and 298.15 K	Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions

t/°C	Sodium chloride mass %	Sodium chloride mol % (compiler)	Sodium bromate mass %	Sodium bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
10	26.32	9.919	0.00	0.00	-	A
	24.53	9.619	5.02	0.762	1.236	A+B
	24.53	9.619	5.02	0.762	1.233	"
	24.51	9.608	5.01	0.761	1.235	"
	(Av) 24.52	9.614	5.02	0.762	1.235	"
	23.61	9.214	5.32	0.804	1.229	B
	20.75	7.995	6.41	0.957	1.213	"
	16.15	6.125	8.58	1.26	1.199	"
	9.84	3.70	12.75	1.857	1.192	"
	4.85	1.84	17.28	2.534	1.193	"
	0.00	0.00	23.24[b]	3.489	1.211	"
25	26.46	9.984	0.00	0.00	1.195	A
	25.55	9.827	2.48	0.369	1.215	"
	24.35	9.598	5.62	0.858	1.236	"
	23.93	9.536	6.92	1.07	1.247	A+B
	23.95	9.546	6.92	1.07	1.248	"
	23.93	9.536	6.92	1.07	1.246	"
	23.95	9.545	6.91	1.07	1.247	"
	23.92	9.530	6.91	1.07	1.249	"
	(Av) 23.94	9.541	6.92	1.07	1.247	"

continued.....

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts: these complexes were rotated in a large thermostat for about two days, a time found to be sufficient for attaining equilibrium.

Samples of saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. Sodium chloride was found by difference.

For the determination of solid phase compositions, the method of algebraic extrapolation of tie-lines was used.

SOURCE AND PURITY OF MATERIALS:

C.p. grade salts were recrystallized, dried to the anhydrous state, and kept constantly in a 100°C oven.

ESTIMATED ERROR:

Soly: accuracy within 0.2 %.
Temp: precision ± 0.01 K.
Densities: precision about 0.1 %.

REFERENCES:

COMPONENTS:
(1) Sodium chloride; NaCl; [7647-14-1]
(2) Sodium bromate; $NaBrO_3$; [7789-38-0]
(3) Water; H_2O; [7732-18-5]

ORIGINAL MEASUREMENTS:
Ricci, J.E.
J. Am. Chem. Soc. 1934, 56, 299-303.

EXPERIMENTAL VALUES: (Continued)

Composition of saturated solutions

t/°C	Sodium chloride mass %	Sodium chloride mol % (compiler)	Sodium bromate mass %	Sodium bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
25	20.99	8.279	8.32	1.27	1.234	B
	17.55	6.869	10.34	1.568	1.234	"
	12.95	5.053	13.67	2.066	1.228	"
	9.98	3.91	16.31	2.473	1.225	"
	8.27	3.25	17.98	2.736	1.228	"
	6.17	2.44	20.27	3.107	1.229	"
	3.76	1.50	23.13	3.585	1.241	"
	0.00	0.00	28.29[b]	4.498	1.257	"

[a] A = NaCl; B = $NaBrO_3$

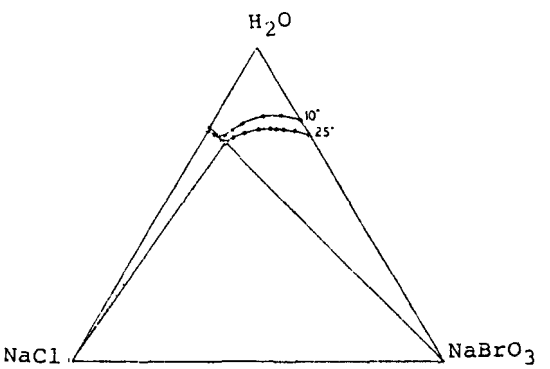
[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.006 mol kg^{-1} at 10°C

= 2.614 mol kg^{-1} at 25°C

COMMENTS AND/OR ADDITIONAL DATA:

The phase diagram is given below (based on mass % units).



COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromide; NaBr; [7647-15-6] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1934, 56, 299-303.
VARIABLES:	**PREPARED BY:**
Composition at 283, 298 and 318 K	Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions

	Sodium Bromide		Sodium Bromate		Density	Nature of the
t/°C	mass %	mol %	mass %	mol %	g cm^{-3}	solid phase[a]
10	45.89	12.93	0.00	0.00	1.492	A
	44.50	12.77	2.58	0.505	1.519	A+B
	44.54	12.79	2.58	0.505	1.516	"
	44.49	12.76	2.58	0.505	1.515	"
	(Av)44.51	12.77	2.58	0.505	1.517	"
	43.09	12.18	2.83	0.545	1.498	B
	39.40	10.72	3.55	0.658	1.452	"
	11.10	2.488	14.46	2.210	1.240	"
	5.33	1.18	18.73	2.827	1.220	"
	0.00	0.00	23.24[b]	3.489	1.211	"
25	48.41	14.11	0.00	0.00	1.530	A
	47.37	14.00	1.90	0.383	1.546	"
	46.84	13.95	2.93	0.595	1.555	A+B
	46.81	13.94	2.94	0.597	1.558	"
	46.82	13.94	2.94	0.597	1.555	"
	46.81	13.94	2.94	0.597	1.553	"
	(Av)46.82	13.94	2.94	0.597	1.555	"

continued.....

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts: these complexes were rotated in a large thermostat for about two days, a time found to be sufficient for attaining equilibrium.
Samples of the saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. NaBr was found by difference. For the determination of solid phase compositions, the method of algebraic extrapolation of tie-line was used.

SOURCE AND PURITY OF MATERIALS:

C.p. grade salts were recrystallized, dried to the anhydrous state, and kept constantly in a 100°C oven.

ESTIMATED ERROR:

Soly: accuracy within 0.2 %
Temp: precision ± 0.01 K.
Densities: precision about 0.1 %.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromide; NaBr; [7647-15-6]	Ricci, J.E.
(2) Sodium bromate; $NaBrO_3$; [7789-38-0]	*J. Am. Chem. Soc.* 1934, *56*, 299-303.
(3) Water; H_2O; [7732-18-5]	

EXPERIMENTAL VALUES: (Continued)

Composition of saturated solutions

t/°C	Sodium Bromide mass %	Sodium Bromide mol % (compiler)	Sodium bromate mass %	Sodium bromate mol % (compiler)	Density g cm^{-3}	Nature of the sold phase[a]
25	45.62	13.40	3.15	0.631	1.542	B
	39.24	10.81	4.61	0.866	1.462	"
	38.66	10.59	4.78	0.893	1.457	"
	29.83	7.628	7.86	1.37	1.377	"
	21.27	5.183	12.04	2.001	1.320	"
	13.82	3.275	16.72	2.702	1.282	"
	6.46	1.51	22.38	3.564	1.270	"
	0.00	0.00	28.29[b]	4.498	1.257	"
45	52.55	16.24	0.00	0.00	-	A
	50.66	16.09	3.51	0.760	-	A+B
	50.70	16.11	3.50	0.758	-	"
	(Av) 50.68	16.10	3.51	0.761	-	"
	49.39	15.45	3.72	0.793	-	B
	28.69	7.554	11.17	2.006	-	"
	7.91	1.98	26.65	4.545	-	"
	0.00	0.00	34.22[b]	5.848	-	"

[a] A = $NaBr.2H_2O$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

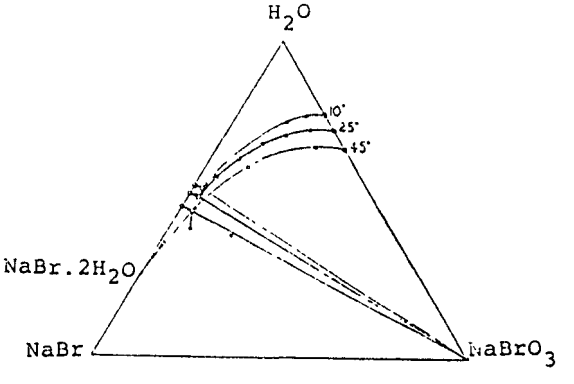
soly of $NaBrO_3$ = 2.006 mol kg^{-1} at 10°C

= 2.614 mol kg^{-1} at 25°C

= 3.448 mol kg^{-1} at 45°C

COMMENTS AND/OR ADDITIONAL DATA:

The phase diagram is given below (based on mass % units).



COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromide; NaBr; [7647-15-6] (2) Sodium bromate; $NaBrO_3$; [7789-38-0] (3) Water; H_2O; [7732-18-5]	Klebanov, G.S.; Basova, E.P. *Zh. Prikl. Khim.* 1939, *12*, 1601-9.
VARIABLES: Composition at 303 K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 30°C

Sodium Bromide		Sodium Bromate		Nature of the solid phase[a]
mass %	mol % (compiler)	mass %	mol % (compiler)	
50.57	15.19	-	-	A
47.92	14.58	3.31	0.687	A+B
39.69	11.05	4.94	0.938	B
27.94	7.150	9.69	1.69	"
18.18	4.450	15.30	2.554	"
8.73	2.100	22.59	3.699	"
-	-	31.95[b]	5.308	"

[a] A = $NaBr.2H_2O$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

soly of $KBrO_3$ = 3.112 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The isothermal method was used. Prior to the experiment, the carbon dioxide content in solution was checked by phenolphthalein. The salt and water were placed into a tube equipped with a stirrer. The tube was kept in a water thermostat. Equilibrium was reached in a day. The sodium bromate content was determined iodometrically. The sodium bromide content was determined as follows: sulfurous acid solution was added to the sample solution containing sodium bromate and bromide, and the solution boiled to remove excess SO_2. Bromide was determined by Volhard's method using standardized silver nitrate solution. The sodium bromide content was calculated by difference. The composition of the solid phase was identified by Schreinemakers' method, and by crystallography.

SOURCE AND PURITY OF MATERIALS:

Analytical grade sodium bromide was used. The sodium bromide contained 0.2% NaCl or less. Sodium bromate was prepd as follows: (1) Barium chloride was added to barium bromate solution, and the resulting solution was treated with sodium sulfate solution. The sodium bromate obtained was recrystallized. (2) The reaction $Br_2 + 5Cl_2 + 12NaOH = 2NaBrO_3 + 10NaCl + 6H_2O$ was used to prepare the sodium bromate.

ESTIMATED ERROR:

Nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium bromate; $NaBrO_3$; [7789-38-0] (2) Sodium iodide; NaI; [7681-82-5] (3) Water; H_2O; [7732-18-5]	Ricci, J.E. *J. Am. Chem. Soc.* 1934, 56, 299-301.
VARIABLES: Composition at 298.15 K	**PREPARED BY:** Hiroshi Miyamoto

EXPERIMENTAL VALUES: Composition of saturated solutions at 25°C

Sodium iodide mass %	Sodium iodide mol % (compiler)	Sodium bromate mass %	Sodium bromate mol % (compiler)	Density g cm^{-3}	Nature of the solid phase[a]
64.71	18.06	0.00	0.00	1.904	A
63.98	18.02	1.17	0.327	1.911	A+B
64.00	18.03	1.17	0.327	1.913	"
63.93	17.98	1.16	0.324	1.920	"
64.00	18.03	1.17	0.327	1.916	"
(Av) 63.95	18.00	1.17	0.327	1.914	"
62.13	16.90	1.30	0.351	1.874	B
60.65	16.07	1.44	0.379	1.836	"
54.89	13.26	2.23	0.535	1.727	"
48.11	10.61	3.62	0.793	1.619	"
40.76	8.296	5.78	1.17	1.521	"
32.21	6.067	8.92	1.67	1.438	"
17.32	2.967	16.57	2.819	1.332	"
0.00	0.00	28.29[b]	4.498	1.257	"

[a] A = $NaI.2H_2O$; B = $NaBrO_3$

[b] For the binary system the compiler computes the following:

soly of $NaBrO_3$ = 2.614 mol kg^{-1}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The ternary complexes were prepared from weighed amounts of water and the two anhydrous salts: these complexes were rotated in a large thermostat for about two days, a time found to be sufficient for attaining equilibrium.
Samples of the saturated solution were withdrawn by means of a calibrated pipet provided with a folded filter paper at the tip. The bromate was determined by titration with standard sodium thiosulfate solution, and the total solids by evaporation at 100°C and drying at 250°C. Sodium iodide was found by difference.
For the determination of solid phase compositions, the method of algebraic extrapolation of tie-lineswas used.

SOURCE AND PURITY OF MATERIALS:
C.p. grade salts were recrystallized, dried to the anhydrous state, and kept constantly in a 100°C oven.

ESTIMATED ERROR:
Soly: accuracy within 0.2 %.
Temp: precision ± 0.01 K.
Densities: precision about 1 %.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium Bromate; $NaBrO_3$; [7789-38-0] (2) Silver Bromate; $AgBrO_3$; [7783-89-3] (3) Water; H_2O; [7732-18-5]	Ricci, J. E.; Aleshnick, J. J. *J. Am. Chem. Soc.* 1944, *66*, 980-3.
VARIABLES: T/K = 278, 298, 323 Composition	**PREPARED BY:** H. Miyamoto

EXPERIMENTAL VALUES:

Composition of Saturated Aqueous Solutions:

t/°C	$NaBrO_3$ (mass %)	$NaBrO_3$ (mol kg^{-1}) (compiler)	$AgBrO_3$ (mass %)	$AgBrO_3$ (mol kg^{-1}) (compiler)	Density (kg dm^{-3})	Nature of solid phase[b]
5	21.41	1.805	-	-	1.192	N
	21.32	1.796	-	-	1.190	SSI + AN
	--	--	0.0905[a]	0.000384	0.9998	A
25	28.26	2.611	-	-	1.264	N
	28.26	2.611	-	-	1.264	SSI
	28.24	2.608	-	-	1.261	SSI
	28.21	2.604	-	-	1.262	SSI
	28.16	2.598	-	-	1.261	SSI
	28.14	2.595	-	-	1.260	SSI
	28.08	2.587	-	-	1.260	SSI
	27.97[a]	2.573	-	-	1.260	SSI + AN
	27.84	2.557	-	-	1.257	AN
	27.78	2.549	-	-	1.257	AN
	27.66	2.534	-	-	1.256	AN
	27.41	2.502	-	-	1.252	AN
	27.35	2.495	-	-	1.251	AN
	27.05	2.457	-	-	1.248	AN
	26.42	2.380	-	-	1.241	AN
	25.36	2.252	-	-	1.232	AN
	24.32	2.130	-	-	1.220	AN
	22.71	1.947	-	-	1.203	AN
	21.28	1.791	-	-	1.185	SSII

continued.....

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The ternary complexes were prepared by weight, using distilled water, c.p. $NaBrO_3$ and c.p. $AgBrO_3$. Attainment of equilibrium was proved in almost all cases by repeated analysis of the solution after further stirring. The complexes were stirred for periods of 2 or 8 weeks. In the last one or two mixtures at 25°C in above table (next page), $AgBrO_3$ content was determined gravimetrically as AgBr after reduction with $NaNO_2$. $NaBrO_3$ was determined by evaporation of the solution to dryness.

SOURCE AND PURITY OF MATERIALS:

C.p. $AgBrO_3$ and c.p. $NaBrO_3$ were used. The purity of the c.p. $NaBrO_3$ was found to be (100 ± 0.1%). The purity of the c.p. $AgBrO_3$ was determined to be 98.2% silver bromate and 1.8% sodium bromate.

ESTIMATED ERROR:

Solubility errors in solubility of $AgBrO_3$ in water and of $NaBrO_3$ in water are ±0.004 mass % and ±0.02 mass %, respectively. Temperature: nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Sodium Bromate; $NaBrO_3$; [7789-38-0]	Ricci, J. E.; Aleshnick, J. J.
(2) Silver Bromate; $AgBrO_3$; [7783-89-3]	*J. Am. Chem. Soc.* 1944, *66*, 980-3.
(3) Water; H_2O; [7732-18-5]	

EXPERIMENTAL VALUES: (Continued)

Composition of Saturated Aqueous Solutions:

t/°C	$NaBrO_3$ (mass %)	$NaBrO_3$ (mol kg^{-1}) (compiler)	$AgBrO_3$ (mass %)	$AgBrO_3$ mol kg^{-1}) (compiler)	Density (kg dm^{-3})	Nature of solid phase[b]
25	16.99	1.356	-	-	1.143	SSII
	13.04	0.994	-	-	1.108	SSII
	10.28	0.759	-	-	1.079	SSII
	8.39	0.607	-	-	1.062	SSII
	7.17	0.512	0.01	0.0004	1.051	SSII
	3.92	0.270	0.03	0.0013	1.025	SSII
	--	--	0.204[c]	0.00867	0.9985	A
50	35.64	3.670	-	-	1.341	N
	35.24[d]	5.606	-	-	1.334	SSI + AN
	35.05	3.576	-	-	1.334	AN
	34.73	3.526	-	-	1.331	AN
	34.57	3.501	-	-	-	AN
	28.77	2.677	-	-	1.258	SSII
	23.32	2.015	-	-	1.196	SSII
	--	--	0.430[c]	0.0183	0.9934	A

[a]Average of 16 determinations.

[b]N = $NaBrO_3$; A = $AgBrO_3$; SSI = solid solution containing up to 2.5-3.0 mass % $AgBrO_3$
SSII = solid solution containing $AgBrO_3$ from 61 to 95 mass %

[c]The solubilities of pure $AgBrO_3$ were determined on samples of c.p. $AgBrO_3$ which were repeatedly washed with considerable quantities of water. The purity of about 99.7% was finally thus obtained, but the author stated that great accuracy cannot be claimed for these solubilities.

[d]Average of 3 determinations.

The phase diagram is given below for this system at 25°C.