

## Magnesium chlorate

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Magnesium chlorate; Mg(ClO <sub>3</sub> ) <sub>2</sub> ; [10326-21-3]		Mylius, F.; Funk, R.		
(2) Water; H <sub>2</sub> O; [7732-18-5]		Ber. Dtsch. Chem. Ges. <u>1897</u> , 30, 1716-25.		
VARIABLES:	PREPARED BY:			
T/K = 291	Hiroshi Miyamoto			
EXPERIMENTAL VALUES:				
The solubility of Mg(ClO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O in water at 18°C is given below:				
56.3 mass % (authors) 128.6 g/100g <sup>a</sup> H <sub>2</sub> O (authors)				
6.726 mol kg <sup>-1</sup> (compiler)				
The density of the saturated solution is given:				
1.594 g cm <sup>-3</sup>				
Based on this density, the compiler calculated the solubility in volume units as				
4.690 mol dm <sup>-3</sup>				
<sup>a</sup> The compiler presumes that the first word in the fifth line from the end of page 1717 should read 100g.				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The salt and water were placed in a bottle and the bottle was shaken in a thermostat for a long time. After the saturated solution settled, an aliquot of solution was removed with a pipet. Magnesium chlorate was determined by evaporation of the solution to dryness. The density of the saturated solution was also determined.	The salt used was purchased as a "pure" chemical, and traces of impurities were not present. The purity sufficed for the solubility determination.			
ESTIMATED ERROR:				
Solv: precision within 1 % Temp: nothing specified				
REFERENCES:				

<b>COMPONENTS:</b> (1) Magnesium chlorate; $Mg(ClO_3)_2$ ; [10326-21-3] (2) Water; $H_2O$ ; [7732-18-5]		<b>ORIGINAL MEASUREMENTS:</b> Meusser, A. <i>Ber. Dtsch. Chem. Ges.</i> <u>1902</u> , 35, 1414-24.		
<b>VARIABLES:</b> $T/K = 255 \text{ to } 366$		<b>PREPARED BY:</b> Hiroshi Miyamoto		
<b>EXPERIMENTAL VALUES:</b>				
$t/^\circ C$	<b>Magnesium Chlorate<sup>a</sup></b>	Nature of the solid phase		
	mass %	$mol/100 mol H_2O$	$m_1/mol kg^{-1}$	
	(compiler)	(compiler)	(compiler)	
-12	26.35	3.371	1.871	Ice
-8	22.24	2.695	1.496	"
-18	51.64	10.061	5.585	$Mg(ClO_3)_2 \cdot 6H_2O$
0	53.27	10.740	5.962	"
18	56.50	12.238	6.793	"
29	60.23	16.269	7.920	"
35	63.65	16.498	9.158	"
42	63.82	16.620	9.225	$Mg(ClO_3)_2 \cdot 4H_2O$
65.5	69.12	21.089	11.71	
39.5	65.37	17.785	9.872	$Mg(ClO_3)_2 \cdot 2H_2O$
61	69.46	21.429	11.89	
68	70.69	22.724	12.61	"
93	(73.71) <sup>b</sup>	26.416	14.66	"

<sup>a</sup> Molalities and  $mol/100 mol H_2O$  calculated by compiler using 1977 IUPAC recommended atomic weights.

<sup>b</sup> No explanation for parenthesis is given.

#### AUXILIARY INFORMATION

##### METHOD/APPARATUS/PROCEDURE:

The salt and water were placed into a test tube and agitated for one hour. The saturated solutions were withdrawn with a pipet, and Mg content of the solution was weighed as sulfate.

##### SOURCE AND PURITY OF MATERIALS:

Pure  $Mg(ClO_3)_2 \cdot 6H_2O$  was recrystallized. The product was used in solubility determination. No other information was given.

##### ESTIMATED ERROR:

Nothing specified.

##### REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Magnesium bromate; $Mg(BrO_3)_2$ ; [14519-17-6]	Linke, W. F.
(2) Water; $H_2O$ ; [7732-18-5]	J. Am. Chem. Soc. 1955, 77, 866-7.

## EXPERIMENTAL VALUES:

t/°C	Magnesium Bromate			Density ρ/g cm <sup>-3</sup>	Nature of the Solid Phase <sup>a</sup>
	mass %	mol % (compiler)	$m_J/mol kg^{-1}$ (compiler)		
- 1.6	9.34	0.658	0.368	--	I
- 4.2	20.94	1.675	0.9456	--	"
-10.1	34.66	3.299	1.894	--	"
-13.0	38.5 <sup>b</sup>	3.87	2.23	1.448	I + A
0	42.34	4.51 <sub>0</sub>	2.62 <sub>1</sub>	1.512	A
10	45.58	5.11 <sub>1</sub>	2.99 <sub>0</sub>	1.562	"
20	48.6 <sub>6</sub>	5.74 <sub>6</sub>	3.38 <sub>4</sub>	1.609	"
30	51.4	6.37	3.78	1.662	"
40	54.5	7.15	4.28	1.722	"
50	57.3	7.94	4.79	1.787	"
65	62.5	9.68	5.95	1.900	"
75	66.8	11.5	7.18	2.013	"
78	68.3	12.2	7.69	2.070	"
80.5 <sup>b</sup>	70.15	13.13	8.390	--	"
80.0 <sup>b</sup>	70.1 <sup>b</sup>	13.1	8.37	--	A + B
81	70.1	13.1	8.37	--	B
90	70.8	13.5	8.66	--	"
100	71.9	14.1	9.13	--	B
117	72.6	14.6	9.46	--	"
130	73.3	15.0	9.80	--	"
134 <sup>b,c</sup>	73.6 <sup>c</sup>	15.2	9.95	--	"

<sup>a</sup> I = Ice; A =  $Mg(BrO_3)_2 \cdot 6H_2O$ ; B =  $Mg(BrO_3)_2 \cdot 2H_2O$

<sup>b</sup> Estimated graphically; <sup>c</sup>: Boiling point.

The solubility (S) of  $Mg(BrO_3)_2 \cdot 6H_2O$  increases linearly from the eutectic (-13.0°C) to 65°C, and the relation was given as follows:

$$S = 4.24 + 0.300t$$

over this range with an average deviation 0.1 from the experimental values. The relation between the solubility (S') of  $Mg(BrO_3)_2 \cdot 2H_2O$  and the temperature (from 80°C to boiling point) is given as follows:

$$S' = 65.1 + 0.064t$$

with an accuracy of  $\pm 0.1$ .

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Magnesium bromate; $Mg(BrO_3)_2$ ; [14519-17-6]  (2) Water; $H_2O$ ; [7732-18-5]	Linke, W. F.  <i>J. Am. Chem. Soc.</i> <u>1955</u> , <u>77</u> , 866-7.
VARIABLES:  $T/K = 260.2 \text{ to } 407$	PREPARED BY:  Hiroshi Miyamoto

## EXPERIMENTAL VALUES:

EXPERIMENTAL VALUES:	

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Isothermal method used. Below 80°C solutions were equilibrated in a water thermostat, and above 80°C a vapor bath (1) was used. All samples were stirred internally. Repeated analysis showed that equilibrium was attained within an hour in every case. In a few cases equilibrium was checked by approach from supersaturation. Each reported value is the average of at least two independent determinations. The bromate content was determined by iodometry. Analysis for magnesium by precipitation of the oxime was done by reducing the bromate ions prior to the addition of the oxime; KBr or KI plus HCl were added, and the solution was boiled to expel the liberated halogens. The densities of solutions in equil. with the hexahydrate were determined in a small pyknometer.	Magnesium bromate hexahydrate was prepared by the addition of $MgSO_4$ solution to a hot suspension of $Ba(BrO_3)_2 \cdot H_2O$ . The precipitate was allowed to digest overnight and then separated by filtration. The solution was evaporated by boiling until it became rather sirupy. Upon cooling the mass solidified completely. The salt was recrystallized twice and then air-dried. Found: $Mg(BrO_3)_2$ , 72.03%. Calcd. for $Mg(BrO_3)_2 \cdot 6H_2O$ : $Mg(BrO_3)_2$ , 72.15%. Magnesium bromate dihydrate was prepared by heating the hexahydrate to 50-60°C. Found: $Mg(BrO_3)_2$ , 88.67%. Calcd. for $Mg(BrO_3)_2 \cdot 2H_2O$ : $Mg(BrO_3)_2$ , 88.61%.
	ESTIMATED ERROR: Soly: precision 0.2% Temp: below 80°C, $\pm 0.05^\circ C$ ; above 80°C, $\pm 0.5^\circ C$
	REFERENCES: 1. Linke, W. F. <i>J. Chem. Educ.</i> <u>1952</u> , <u>29</u> , 492.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Magnesium iodate; $Mg(Io_3)_2$ ; [7790-32-1]	Mylius, F.; Funk, R.
(2) Water; $H_2O$ ; [7732-18-5]	Ber. Dtsch. Chem. Ges. 1897, 30, 1716-25.
VARIABLES: $T/K = 273 - 373$	PREPARED BY: Hiroshi Miyamoto

## EXPERIMENTAL VALUES:

t/°C	Magnesium Iodate mass %	$m_1/mol\ kg^{-1}^a$	Nature of the solid phase
0	3.1	0.086	$Mg(Io_3)_2 \cdot 10H_2O$
20	10.2	0.304	"
30	17.4	0.563	"
35	21.9	0.750	"
50	67.5	5.55	"
0	6.8	0.20	$Mg(Io_3)_2 \cdot 4H_2O$
10	6.4	0.18	"
18 <sup>b</sup>	6.44	0.184	"
20	7.7	0.22	"
35	8.9	0.26	"
63	12.6	0.385	"
100	19.3	0.639	"

<sup>a</sup> Molalities calculated by compiler

<sup>b</sup> The solubility, 6.88 g/100g  $H_2O$ , and the density of the saturated solution, 1.078, were also reported.

The compiler presumes that the first word in the fifth line from the end of page 1717 should read 100g.

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The salt and water were placed in a bottle. The bottle was shaken in a constant temperature bath for a long time. After the saturated solution settled, an aliquot of solution was removed with a pipet. Magnesium iodate was determined by evaporation of the solution to dryness. The density of the saturated solution was also determined.	The salt used was purchased as "pure" chemical, and traces of impurities were not present. The purity sufficed for the solubility determination.
	ESTIMATED ERROR: Solv: precision within 1 %. Temp: nothing specified
	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:																																																																															
(1) Magnesium iodate; $Mg(Io_3)_2$ ; [7790-32-1]		Hill, A. E.; Moskowitz, S.																																																																															
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VARIABLES:		PREPARED BY:																																																																															
$T/K = 272.79 - 363$		Hiroshi Miyamoto																																																																															
EXPERIMENTAL VALUES:																																																																																	
<table border="1"> <thead> <tr> <th rowspan="2"><math>t/^\circ C</math></th> <th colspan="2">Magnesium Iodate</th> <th rowspan="2">Nature of the Solid Phase<sup>b</sup></th> </tr> <tr> <th>mass %</th> <th><math>m_I/mol kg^{-1}a</math></th> </tr> </thead> <tbody> <tr><td>- 0.36</td><td>3.18</td><td>0.0878</td><td>A + ice</td></tr> <tr><td>+ 5</td><td>4.39</td><td>0.1227</td><td>A</td></tr> <tr><td>10</td><td>5.87</td><td>0.1667</td><td>A</td></tr> <tr><td>15</td><td>7.79</td><td>0.2258</td><td>A(m)</td></tr> <tr><td>5</td><td>6.09</td><td>0.1733</td><td>B(m)</td></tr> <tr><td>10</td><td>6.68</td><td>0.1913</td><td>B(m)</td></tr> <tr><td>15</td><td>7.29</td><td>0.2102</td><td>B</td></tr> <tr><td>25</td><td>8.55</td><td>0.2499</td><td>B</td></tr> <tr><td>35</td><td>9.83</td><td>0.2914</td><td>B</td></tr> <tr><td>40</td><td>10.51</td><td>0.3139</td><td>B</td></tr> <tr><td>50</td><td>12.05</td><td>0.3662</td><td>B</td></tr> <tr><td>57.5</td><td>13.1</td><td>0.403</td><td>B</td></tr> <tr><td>70</td><td>15.7</td><td>0.498</td><td>B(m)</td></tr> <tr><td>90</td><td>19.6</td><td>0.652</td><td>B(m)</td></tr> <tr><td>60</td><td>13.2</td><td>0.406</td><td>C</td></tr> <tr><td>70</td><td>13.3</td><td>0.410</td><td>C</td></tr> <tr><td>80</td><td>13.4</td><td>0.414</td><td>C</td></tr> <tr><td>90</td><td>13.5</td><td>0.417</td><td>C</td></tr> </tbody> </table>				$t/^\circ C$	Magnesium Iodate		Nature of the Solid Phase <sup>b</sup>	mass %	$m_I/mol kg^{-1}a$	- 0.36	3.18	0.0878	A + ice	+ 5	4.39	0.1227	A	10	5.87	0.1667	A	15	7.79	0.2258	A(m)	5	6.09	0.1733	B(m)	10	6.68	0.1913	B(m)	15	7.29	0.2102	B	25	8.55	0.2499	B	35	9.83	0.2914	B	40	10.51	0.3139	B	50	12.05	0.3662	B	57.5	13.1	0.403	B	70	15.7	0.498	B(m)	90	19.6	0.652	B(m)	60	13.2	0.406	C	70	13.3	0.410	C	80	13.4	0.414	C	90	13.5	0.417	C
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<sup>a</sup> Molalities calculated by compiler. <sup>b</sup> A = $Mg(Io_3)_2 \cdot 10H_2O$ ; B = $Mg(Io_3)_2 \cdot 4H_2O$ ; C = $Mg(Io_3)_2$ (m) indicates that the solid phase was metastable.																																																																																	
AUXILIARY INFORMATION																																																																																	
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																																																																																
Excess magnesium iodate was added to distilled water in glass-stoppered Pyrex tubes. For the lower temperatures the tubes were rotated in a water thermostat. For temperatures above 50°C the tubes were placed in an air thermostat and stirred by means of a brass paddle on a mechanical stirrer. Filtered samples were withdrawn by calibrated pipets at the lower temperatures and weighed to give approximate figures for density. At the higher temperatures the samples were forced through a tube into a weighing bottle by air pressure. At lower temperatures, one to three days were found sufficient to attain equilibrium from undersaturation. The time required for the change from the tetrahydrate to the anhydrite was 4 days at 80°C and 2 days at 90°C. At 70°C the solid phase used was anhydrous salt. Equilibrium at the higher temperatures being reached within one days. The iodate content was determined iodometrically.	Magnesium iodate was prepared by neutralizing an aqueous solution of $HIO_3$ with $MgCO_3$ and evaporating the slightly acidified solution at above 40-50°C for 4 days, which gave a copious crystallization of the tetrahydrate. The crystals were washed with water, air-dried, ground and placed in a desiccator.																																																																																
ESTIMATED ERROR: Solv: nothing specified Temp: water thermostat, constant to about 0.03°C																																																																																	
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COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Calcium chlorate; $\text{Ca}(\text{ClO}_3)_2$ ; [10137-74-3]  (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	Mylius, F.; Funk, R.  <u>Ber. Dtsch. Chem. Ges.</u> <u>1897, 30, 1716-25.</u>
VARIABLES:  $T/K = 291$	PREPARED BY:  Hiroshi Miyamoto

## EXPERIMENTAL VALUES:

The solubility of  $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$  in water at  $18^\circ\text{C}$  is given as below:

64 mass % (authors)  
 177.8 g/100g<sup>a</sup>  $\text{H}_2\text{O}$  (authors)  
 $8.589 \text{ mol kg}^{-1}$  (compiler)

The density of the saturated solution at  $18^\circ\text{C}$  is also given:

$1.729 \text{ g cm}^{-3}$

Based on this density, the compiler calculated the solubility in volume units as

$5.346 \text{ mol dm}^{-3}$

<sup>a</sup> The compiler presumes that the first word in the fifth line from the end of page 1717 should read 100g.

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The salt and water were placed in a bottle and the bottle was shaken in a thermostat for a long time. After the saturated solution settled, an aliquot of solution was removed with a pipet. Calcium chlorate was determined by evaporation of the solution to dryness. The density of the saturated solution was also determined.	The salt used was purchased as a "pure" chemical, and the traces of impurities were not present. The purity sufficed for the solubility determination.
	ESTIMATED ERROR: Solv: precision within 1 % Temp: nothing specified
	REFERENCES:

## COMPONENTS:

- (1) Calcium chlorate;  $\text{Ca}(\text{ClO}_3)_2$ ; [10137-74-3]  
 (2) Water;  $\text{H}_2\text{O}$ ; [7732-18-5]

## ORIGINAL MEASUREMENTS:

Egorov, V. S.

*J. Gen. Chem. (U.S.S.R.)* 1931, 1,  
1266-70.

## EXPERIMENTAL VALUES:

t/ $^{\circ}\text{C}$	Calcium Chlorate			Nature of the Solid Phase
	mass %	mol % (compiler)	$m_1/\text{mol kg}^{-1}$ (compiler)	
- 1.0	4.67	0.425	0.237	Ice
- 2.2	9.3	0.88	0.50	"
- 4.2	13.9	1.39	0.780	"
- 6.3	18.6	1.95	1.10	"
- 9.1	23.2	2.56	1.46	"
- 12.9	27.9	3.26	1.87	"
- 17.1	32.5	4.02	2.33	"
- 24.0	37.2	4.90	2.86	"
- 32.9	42.0	5.93	3.50	"
- 34.2	43.0	6.16	3.64	"
- 37.0	44.0	6.40	3.80	"
- 39.6	45.0	6.65	3.95	"
- 41.	45.5	6.77	4.03	Ice + $\text{Ca}(\text{ClO}_3)_2 \cdot 6\text{H}_2\text{O}$
- 37.5	46.0	6.90	4.12	$\text{Ca}(\text{ClO}_3)_2 \cdot 6\text{H}_2\text{O}$
- 30.2	48.0	7.44	4.46	"
- 28	51.2	8.37	5.07	"
- 26.8	55	9.6	5.9	$\text{Ca}(\text{ClO}_3)_2 \cdot 6\text{H}_2\text{O} + \text{Ca}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O}$
- 26.3	55.0	9.62	5.90	$\text{Ca}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O}$
- 16.2	58.0	10.7	6.67	"
- 12.3	60.0	11.5	7.25	"
- 7.8	62.7	12.8	8.12	$\text{Ca}(\text{ClO}_3)_2 \cdot 4\text{H}_2\text{O} + \text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$
- 5.0	63.0	12.9	8.23	$\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$
19.5	66.2	14.6	9.46	"
73.5	76.3	21.9	15.6	"
76	77	23	16	$\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O} + \text{Ca}(\text{ClO}_3)_2$
93	78.0	23.6	17.1	$\text{Ca}(\text{ClO}_3)_2$
127	80.1	25.9	19.4	"
156.5 <sup>a</sup>	82.3	28.8	22.5	"
203	85.0	33.0	27.4	"
290	92	50	56	"

<sup>a</sup>

The compiler assumes that 56.5 in the original paper should read 156.5.

<b>COMPONENTS:</b> (1) Calcium chlorate; $\text{Ca}(\text{ClO}_3)_2$ ; [10137-74-3] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b> Egorov, V. S. <i>J. Gen. Chem. (U.S.S.R.)</i> 1931, 1, 1266-70.
<b>VARIABLES:</b> $T/K = 232 - 563$	<b>PREPARED BY:</b> Hiroshi Miyamoto
<b>EXPERIMENTAL VALUES:</b>	
<b>AUXILIARY INFORMATION</b>	
<b>METHOD/APPARATUS/PROCEDURE:</b> Synthetic method used with visual observation of temperature of crystallization. A copper-constant thermocouple and a millivoltmeter were used for the temperature measurements. At lower temperature, $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ crystals and water were weighed and placed in a sealed vessel. But at higher temperature the anhydrous $\text{Ca}(\text{ClO}_3)_2$ was used. The sealed vessel was fixed to a large test tube and the test tube was placed in a Dewar vessel. The mixture of chloroform, tetrachloro-carbon and bromobenzene was used to cool the test tube and liquid air was also used.	<b>SOURCE AND PURITY OF MATERIALS:</b> $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ was prepared as follows: 20% sulfuric acid solution was added, with cooling, to aqueous $\text{Ba}(\text{ClO}_3)_2$ solution. The remaining barium ions were precipitated with sulfuric acid. The precipitated barium sulfate was filtered off and the filtrate added to c.p. grade $\text{CaCO}_3$ . The barium carbonate was filtered off, and the $\text{Ca}(\text{ClO}_3)_2$ solution obtained was evaporated to dryness to obtain $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ crystals. Analysis for chlorate ions showed 100% purity.
<b>ESTIMATED ERROR:</b> Temp: precision of $\pm 0.2$ K	

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Calcium iodate; $\text{Ca}(\text{IO}_3)_2$ ; [7789-80-2]	Mylius, F.; Funk, R.
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	Ber. Dtsch. Chem. Ges. 1897, 30, 1716-25.
VARIABLES:	PREPARED BY:
$T/K = 273$ to $373$	Hiroshi Miyamoto

## EXPERIMENTAL VALUES:

t/°C	Calcium Iodate mass %	$m_1/\text{mol kg}^{-1}$ (compiler)	Nature of the Solid Phase
0	0.1	0.003	$\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$
10	0.17	0.0044	"
18 <sup>a</sup>	0.25	0.0064	"
30	0.42	0.011	"
40	0.61	0.016	"
50	0.89	0.023	"
54	1.04	0.0270	"
60	1.36	0.0354	"
21	0.37	0.0095	$\text{Ca}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$
35	0.48	0.012	"
40	0.52	0.013	"
45	0.54	0.014	"
50	0.59	0.015	"
60	0.65	0.017	"
80	0.79	0.020	"
100	0.94	0.024	"

<sup>a</sup>The solubility, 0.25 g/100g  $\text{H}_2\text{O}$ , and the density of the saturated solution, 1, were also reported.

The compiler presumes that the first word in the fifth line from the end of page 1717 should read 100g.

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
$\text{Ca}(\text{IO}_3)_2$ crystals and water were placed in bottles. The bottles were shaken in a constant temperature bath for a long time.	The salt used was purchased as "pure" chemical, and traces of impurities were not present. The purity sufficed for the solubility determination.
After the saturated solution settled, an aliquot of solution was removed with a pipet. Calcium iodate was determined by evaporation of the solution to dryness. The density of the saturated solution was also determined.	ESTIMATED ERROR: Solv: precision within 1% (compiler) Temp: nothing specified
	REFERENCES:

COMPONENTS: (1) Calcium iodate; $\text{Ca}(\text{IO}_3)_2$ ; [7789-80-2] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	ORIGINAL MEASUREMENTS: Hill, A. E.; Brown, S. F. <i>J. Am. Chem. Soc.</i> 1931, 53, 4316-20.
VARIABLES: $T/\text{K} = 278$ to 363	PREPARED BY: Hiroshi Miyamoto

## EXPERIMENTAL VALUES:

t/ $^{\circ}\text{C}$	Solubility of Calcium Iodate in Water				Nature of the Solid Phase <sup>b</sup>
	From undersaturation mass %	From supersaturation mass %	Average mass %	Average Molality <sup>a</sup> $10^2 m_1/\text{mol kg}^{-1}$	
5	0.118	0.120	0.119	0.306	A
15	0.194	0.196	0.195	0.501	A
25	0.306	0.307	0.306	0.787	A
30	0.384	0.384	0.384	0.989	A
35	0.475	0.477	0.476	1.227	A + B
40	0.584	---	0.584	1.507	A(m)
25	---	0.405	0.405	1.043	B(m)
40	0.514	0.519	0.517	1.333	B
50	0.589	0.590	0.590	1.522	B
57.5	0.621	---	0.621	1.603	B + C
60	0.652	---	0.652	1.683	B(m)
70	0.811	---	0.811	2.097	B(m)
60	---	0.617	0.617	1.592	C
70	0.643	0.645	0.644	1.662	C
80	0.665	0.665	0.665	1.717	C
90	0.668	0.668	0.668	1.725	C

<sup>a</sup> molalities calculated by compiler.<sup>b</sup> A =  $\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$ ; B =  $\text{Ca}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ ; C =  $\text{Ca}(\text{IO}_3)_2$ ; (m) = metastable.

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: In carrying out the solubility determinations, the specified hydrate in each temperature range was used. The time allowed for equilibrium varied from one day at the highest temperatures to two or three weeks at the lower temperatures. By using metastable phases, several points for metastable equilibrium were obtained, and in which the solubility of the metastable hydrate remained constant for as long a period as two weeks. The equilibrium between the liquid and solid phases was approached from the side of supersaturations and/or undersaturation. The concentration of calcium iodate in liquid phases was determined iodometrically.	SOURCE AND PURITY OF MATERIALS: Calcium iodate was prepared by double decomposition of $\text{Ca}(\text{NO}_3)_2$ and $\text{KIO}_3$ in water, washed, and purified by recrystallization. The hexahydrate obtained by slow cooling within the temperature range below 30°C, the monohydrate below 100°C. Each sample was dried in a desiccator over the next lower hydrate as desiccant, and was analyzed verifying the correct composition within a few tenths of a percent. The anhydride was prepared by dehydration in an oven at 100°C.
	ESTIMATED ERROR: nothing specified
	REFERENCES:

## COMPONENTS:

- (1) Calcium iodate;  $\text{Ca}(\text{IO}_3)_2$ ; [7789-80-2]  
 (2) Water;  $\text{H}_2\text{O}$ ; [7732-18-5]

## ORIGINAL MEASUREMENTS:

Bousquet, J.; Mathurin, D.; Vermande, P.  
*Bull. Soc. Chim. Fr.* 1969, 1111-5.

## EXPERIMENTAL VALUES:

t/°C	Calcium Iodate Activity Product $10^7 K^\circ_{s0}/\text{mol}^3 \text{dm}^{-9}$	Nature of the Solid Phase
14	2.11	hexahydrate
18	3.24	"
22	5.21	"
25	6.98	"
28	9.71	"
30	12.71	"
32	15.42	"
35	20.05	"
38	28.32	"
40	27.2	monohydrate <sup>a</sup>
44.4	31.0	"
47	32.8	"
50	35.4	"
55	40.5	"
60	41.2	anhydrate <sup>a</sup>
70	44.4	"
79	51.7	"
86	55.1	"

<sup>a</sup> There are apparent misprintings of these values in the original article, but the correct values as printed here can be calculated from other data in Table in original article.

The solubility product,  $K^\circ_{s0}$  of  $\text{Ca}(\text{IO}_3)_2 \cdot x\text{H}_2\text{O}$  was defined as

$$K^\circ_{s0} = (C_{\text{Ca}}^{2+} \times C_{\text{IO}_3^-}^2)(Y_{\text{Ca}}^{2+} \times Y_{\text{IO}_3^-}^2)$$

$$= 4S^3 Y_\pm^3 \quad (1)$$

where S represents the solubility,  $y_\pm$  the activity coefficient given by the modified Debye-Hückel equation

$$-\log Y_\pm = Z_+ Z_- A \sqrt{I} - BI \quad (2)$$

From (1) and (2)

$$Y = -BI + 1/3 \log K^\circ_{s0} \quad (3)$$

where  $Y = 1/3 \log (4S^3) - Z_+ Z_- A \sqrt{I}$ , and  $A = 0.5115$  at  $25^\circ\text{C}$ .

The solubility product ( $K^\circ_{s0}$ ) and constant B were evaluated from the intercept and the slope of Y vs I plots. The solubilities of  $\text{Ca}(\text{IO}_3)_2$  in NaCl aqueous solutions were determined in order to obtain Y vs I plots, but these data were not given in the paper.

<b>COMPONENTS:</b> (1) Calcium iodate; $\text{Ca}(\text{IO}_3)_2$ ; [7789-80-2] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b> Bousquet, J.; Mathurin, D.; Vermande, P. <i>Bull. Soc. Chim. Fr.</i> <u>1969</u> , 1111-5.
<b>VARIABLES:</b> $T/\text{K} = 287 - 359$	<b>PREPARED BY:</b> Hiroshi Miyamoto
<b>EXPERIMENTAL VALUES:</b>	
<b>AUXILIARY INFORMATION</b>	
<b>METHOD/APPARATUS/PROCEDURE:</b> Aqueous NaCl solutions and the specified hydrate crystals were placed into glass-stoppered Erlenmeyer flasks. The flasks were stirred in a thermostat for 1-15 hours. The iodate content was determined iodometrically.	<b>SOURCE AND PURITY OF MATERIALS:</b> $\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$ was prepared by mixing aqueous solutions of calcium nitrate and $\text{HIO}_3$ . The product was washed. The monohydrate and anhydrite were prepared from the hexahydrates, which were furnished from BDH and prepared by authors, by hydration.
	<b>ESTIMATED ERROR:</b> Soly: nothing specified Temp: $\pm 0.05^\circ\text{C}$ (authors)
	<b>REFERENCES:</b>

## Strontium chlorate

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Strontium chlorate; $\text{Sr}(\text{ClO}_3)_2$ ; [7791-10-8]		Mylius, F.; Funk, R.		
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]		Ber. Dtsch. Chem. Ges. <u>1897</u> , 30, 1716-25.		
VARIABLES:		PREPARED BY:		
$T/K = 291$		Hiroshi Miyamoto		
EXPERIMENTAL VALUES:				
The solubility of $\text{Sr}(\text{ClO}_3)_2$ in water at 18°C is given as below:				
63.6 mass % (authors) 174.9 g/100g <sup>a</sup> $\text{H}_2\text{O}$ (authors)				
174.7 g/100g $\text{H}_2\text{O}$ (the compiler reculculated) 6.865 mol $\text{kg}^{-1}$ (compiler)				
The density of the saturated solution at 18°C is also given:				
1.839 g $\text{cm}^{-3}$				
Based on this density, the compiler calculated the solubility in volume units as				
4.597 mol $\text{dm}^{-3}$				
<sup>a</sup> The compiler presumes that the first word in the fifth line from the end of page 1717 should read 100g.				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The salt and water were placed in a bottle and the bottle was shaken in a constant temperature bath for a long time. After the saturated solution settled, an aliquot of solution was removed with a pipet. Strontium chlorate was determined by evaporation of the solution by dryness. The density of the saturated solution was also determined.	The salt used was purchased as a "pure" chemical and traces of impurities were not present. The purity sufficed for the solubility determination.			
ESTIMATED ERROR: Solv: precision within 1 % Temp: nothing specified				
REFERENCES:				

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Strontium chlorate; $\text{Sr}(\text{ClO}_3)_2$ ; [7791-10-8]	Linke, W. F.
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<i>J. Am. Chem. Soc.</i> 1953, 75, 5797-800.

## EXPERIMENTAL VALUES:

t/°C	Strontium Chlorate			Density $\rho/\text{g cm}^{-3}$	Nature of the Solid Phase <sup>a</sup>
	mass %	mol % (compiler)	$m_1/\text{mol kg}^{-1}$ (compiler)		
- 38.1 <sup>b</sup>	55.0 <sup>b</sup>	7.96	4.80	--	Ice <sup>c</sup>
- 29.4	49.87	6.578	3.909	--	"
- 22.2	45.11	5.497	3.229	--	"
- 14.2	37.46	4.067	2.353	--	"
- 9.4	29.94	2.936	1.679	--	"
- 4.0	17.92	1.522	0.8578	--	"
- 1.8	9.29	0.720	0.402	--	"
- 37.0 ± 0.5	54.5 <sup>d</sup>	7.82	4.71	--	Ice + A
- 28	57.1	8.61	5.23	--	A
- 16.7	57.9	8.87	5.40	--	"
- 7	59.9	9.56	5.87	--	"
0	61.4	10.1	6.25	--	"
9	63.47	10.95	6.826	--	"
10 ± 1	63.4 <sup>d</sup>	10.9	6.81	1.829	A + B
0 <sup>a</sup>	63.23 <sup>b</sup>	10.85	6.756	1.828	B
15	63.55	10.98	6.850	1.830	"
25	63.78	11.08	6.918	1.831	"
35	64.17	11.25	7.037	1.833	"
45	64.55	11.42	7.154	1.835	B
50	64.65	11.46	7.185	1.837	"
55	64.95	11.60	7.281	1.838	"
65	65.32	11.76	7.400	1.842	"
75	66.0	12.08	7.627	1.845	"
80	66.07	12.11	7.651	1.847	"
85	66.41	12.28	7.768	1.849	"
95	67.08	12.60	8.006	1.853	"
110	67.8	13.0	8.27	1.861	"
121 ± 1	68.7 <sup>d</sup>	13.4	8.62	1.867	"

<sup>a</sup> A =  $\text{Sr}(\text{ClO}_3)_2 \cdot 3\text{H}_2\text{O}$ ; B =  $\text{Sr}(\text{ClO}_3)_2$

<sup>b</sup> Metastable system

<sup>c</sup> Nature of solid phase not specified by author, but assumed by compiler based upon shape of the polytherm plotted in the source paper.

<sup>d</sup> Determined graphically

<b>COMPONENTS:</b> (1) Strontium chlorate; $\text{Sr}(\text{ClO}_3)_2$ ; [7791-10-8] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b> Linke, W. F. <i>J. Am. Chem. Soc.</i> <u>1953</u> , 75, 5797-800.
<b>VARIABLES:</b>  $T/K = 235.1 \text{ to } 394$	<b>PREPARED BY:</b> Hiroshi Miyamoto
<b>EXPERIMENTAL VALUES:</b>	
<b>AUXILIARY INFORMATION</b>	
<b>METHOD/APPARATUS/PROCEDURE:</b>  Temperatures between 0 and 100°C were maintained in water-baths, and at 110°C an acetic acid vapor bath was used (1). At 0°C and below, baths of melting ice and of melting mono-, di- and triethylene glycol were employed. Freezing points were determined from the cooling curves of known mixtures and reproducible to $\pm 0.05^\circ\text{C}$ . Equilibrium in saturated solutions was established by repeated analysis after several hours of stirring. Representative points were checked by approach from supersaturation. Each reported value is the average of at least two closely agreeing determinations. Filtered samples of the solution were withdrawn with preheated calibrated pipets, and approximate densities were calculated. Analysis for chlorate was made by reduction to chloride with nitrite and subsequent Volhard titration.	<b>SOURCE AND PURITY OF MATERIALS:</b>  Strontium chlorate anhydrate was prepared as follows: a chloric acid solution was prepared from roughly equivalent quantities of c.p. grade $\text{Ba}(\text{ClO}_3)_2$ and $\text{H}_2\text{SO}_4$ , and small amounts of $\text{BaO}$ and $\text{H}_2\text{SO}_4$ were then added until no significant tests for $\text{Ba}^{2+}$ or $\text{SO}_4^{2-}$ were obtained. Excess c.p. grade $\text{SrCO}_3$ (previously leached with a large volume of boiling water) was then added to the chloric acid solution. The mixture was filtered, and evaporation by boiling yielded pure anhydrous $\text{Sr}(\text{ClO}_3)_2$ . The solid was recrystallized from water, air-dried, and stored at room temperature. A qualitative flame test showed that no sodium, and only traces of calcium present. Analysis by reduction to chloride and Volhard titration showed 99.6% $\text{Sr}(\text{ClO}_3)_2$ . Loss in weight upon drying at 110°C was 0.26%. $\text{Sr}(\text{ClO}_3)_2 \cdot 3\text{H}_2\text{O}$ was prepared by cooling a concentrated solution of the anhydrous salt in an acetone-dry-ice bath. When the solution had become very viscous, vigorous scratching produced the trihydrate. The excess solution was removed by suction, and the moist solid was stored at 7°C.
<b>ESTIMATED ERROR:</b>  Soly: nothing specified Temp: the maximum variation between 0 and 100°C never exceed $\pm 0.1^\circ\text{C}$ , and was usually much less.	<b>REFERENCES:</b>  1. Linke, W. F. <i>J. Chem. Educ.</i> <u>1952</u> , 29, 429.

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Strontium bromate; $\text{Sr}(\text{BrO}_3)_2$ ; [14519-18-7]		Linke, W. F.		
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]		<i>J. Am. Chem. Soc.</i> 1953, 75, 5797-800.		

## EXPERIMENTAL VALUES:

t/ $^{\circ}\text{C}$	Strontium Bromate			Density $\rho/\text{g cm}^{-3}$	Nature of the Solid Phase <sup>a</sup>
	mass %	mol % (compiler)	$m_1/\text{mol kg}^{-1}$ (compiler)		
- 2.28 <sup>b</sup>	18.48 <sup>b</sup>	1.175	0.6601	--	Ice
- 2.10	16.85	1.052	0.5901	--	"
- 2.03	16.15	1.000	0.5608	--	"
- 1.84	14.94	0.9130	0.5114	--	"
- 1.14	9.38	0.540	0.301	--	"
- 2.18	17.50 <sup>c</sup>	1.100	0.6177	1.165 <sup>c</sup>	Ice + A
0	18.32	1.163	0.6531	1.177	A
4.4	20.11	1.303	0.7330	1.199	"
15	23.97	1.627	0.9180	1.241	"
25	27.25	1.927	1.091	1.285	"
35	30.03	2.202	1.250	1.320	"
45	32.69	2.484	1.414	1.356	"
55	35.15	2.765	1.578	1.384	"
65	37.57	3.060	1.752	1.422	"
72	39.15	3.265	1.873	--	"
75	39.75	3.345	1.921	1.458	"
75.5 $\pm$ 0.5	39.9 <sup>c</sup>	3.365	1.933	1.458 <sup>c</sup>	A + B
76	39.9	3.37	1.93	--	B
77	39.9	3.37	1.93	1.457	"
79	40.1	3.39	1.95	--	"
80	40.1	3.39	1.95	1.461	"
82	40.37	3.430	1.971	--	"
85	40.60	3.461	1.990	1.462	"
90	40.75	3.482	2.003	1.465	"
95	40.89	3.502	2.014	1.465	"
104 $\pm$ 1	41.0 <sup>c</sup>	3.517	2.023	1.470 <sup>c</sup>	"

<sup>a</sup> A =  $\text{Sr}(\text{BrO}_3)_2 \cdot \text{H}_2\text{O}$ ; B =  $\text{Sr}(\text{BrO}_3)_2$

<sup>b</sup> metastable

<sup>c</sup> determined graphically

<b>COMPONENTS:</b>		<b>ORIGINAL MEASUREMENTS:</b>	
(1) Strontium bromate; $\text{Sr}(\text{BrO}_3)_2$ ; [14519-18-7]		Linke, W. F.	
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]		<i>J. Am. Chem. Soc.</i> <u>1953</u> , 75, 5797-800.	
<b>VARIABLES:</b> $T/K = 270.8 \text{ to } 377$		<b>PREPARED BY:</b> Hiroshi Miyamoto	
<b>EXPERIMENTAL VALUES:</b>			
<b>AUXILIARY INFORMATION</b>			
<b>METHOD/APPARATUS/PROCEDURE:</b>	<b>SOURCE AND PURITY OF MATERIALS:</b>		
<p>Temperatures between 0 and 100°C were maintained in water-baths, and at 110°C an acetic acid vapor bath was used (1). At 0°C and below, baths of melting ice and of melting mono-, di- and triethylene glycol were employed. Freezing points were determined from the cooling curves of known mixtures.</p>	<p>Strontium bromate monohydrate was prepared as follows: A bromic acid was prepared from roughly equivalent quantities c.p. grade <math>\text{Ba}(\text{BrO}_3)_2</math> and <math>\text{H}_2\text{SO}_4</math>. Excess c.p. grade <math>\text{SrCO}_3</math> (previously leached with a large volume of boiling water) was then added to the bromic acid solution. The mixture was filtered, and then the solution of <math>\text{Sr}(\text{BrO}_3)_2</math> was evaporated. The salt was recrystallized from water and air-dried. Iodometry showed 95.2% <math>\text{Sr}(\text{BrO}_3)_2</math> (Calcd. for <math>\text{Sr}(\text{BrO}_3)_2 \cdot \text{H}_2\text{O}</math> 95.0%). Loss in weight at 110°C was 4.89% (Calcd. 4.99%).</p>		
<p>Equilibrium in saturated solutions was established by repeated analysis after several hours of internal stirring. Representative points were checked by approach from supersaturation. Each reported value is the average of at least two closely agreeing determinations. Filtered samples of the solution were withdrawn with preheated calibrated pipets, and approximate densities were calculated.</p>	<b>ESTIMATED ERROR:</b> Soly: accuracy 0.1 - 0.2% Temp: $\pm 0.1^\circ\text{C}$ (compiler assumes)		
The bromate content was determined iodometrically.		<b>REFERENCES:</b> 1. Linke, W. F. <i>J. Chem. Educ.</i> <u>1952</u> , 29, 492.	

<b>COMPONENTS:</b> (1) Strontium iodate; $\text{Sr}(\text{IO}_3)_2$ ; [13470-01-4] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]		<b>ORIGINAL MEASUREMENTS:</b> Linke, W. F. <i>J. Am. Chem. Soc.</i> 1953, 75, 5797-800.																																																																																																						
<b>VARIABLES:</b> $T/K = 273 - 368$		<b>PREPARED BY:</b> Hiroshi Miyamoto																																																																																																						
<b>EXPERIMENTAL VALUES:</b>																																																																																																								
<b>t/°C</b>		<b>Strontium Iodate</b>																																																																																																						
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="text-align: center;"><b>Anhydride<sup>a</sup></b></th> <th style="text-align: center;"><b>Monohydrate<sup>a</sup></b></th> <th style="text-align: center;"><b>Hexahydrate<sup>a</sup></b></th> </tr> <tr> <th style="text-align: center;">mass % <math>10^3 m_1/\text{mol kg}^{-1}</math> (compiler)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td><td style="text-align: center;">0.098m</td><td style="text-align: center;">2.243</td><td style="text-align: center;">0.0861</td><td style="text-align: center;">1.970</td></tr> <tr> <td style="text-align: center;"><math>t \pm 1g</math></td><td style="text-align: center;">0.117g</td><td style="text-align: center;">2.678</td><td style="text-align: center;">0.117g</td><td style="text-align: center;">2.678</td></tr> <tr> <td style="text-align: center;">7</td><td style="text-align: center;">0.120</td><td style="text-align: center;">2.747</td><td style="text-align: center;">0.1230m</td><td style="text-align: center;">2.815</td></tr> <tr> <td style="text-align: center;">11</td><td style="text-align: center;">0.130</td><td style="text-align: center;">2.976</td><td style="text-align: center;">0.1505m</td><td style="text-align: center;">3.446</td></tr> <tr> <td style="text-align: center;">15</td><td style="text-align: center;">0.138</td><td style="text-align: center;">3.159</td><td style="text-align: center;">0.1822m</td><td style="text-align: center;">4.173</td></tr> <tr> <td style="text-align: center;">18</td><td style="text-align: center;">--</td><td style="text-align: center;">--</td><td style="text-align: center;">0.2135m</td><td style="text-align: center;">4.891</td></tr> <tr> <td style="text-align: center;">20</td><td style="text-align: center;">0.161</td><td style="text-align: center;">3.687</td><td style="text-align: center;">0.2302m</td><td style="text-align: center;">5.274</td></tr> <tr> <td colspan="2" style="text-align: center;"><math>t_{20.8}</math></td><td></td><td></td><td></td></tr> <tr> <td style="text-align: center;"><math>\pm 0.5g</math></td><td style="text-align: center;">--</td><td style="text-align: center;">--</td><td style="text-align: center;">0.241m,g</td><td style="text-align: center;">5.523</td></tr> <tr> <td style="text-align: center;">25</td><td style="text-align: center;">0.165</td><td style="text-align: center;">3.778</td><td style="text-align: center;">0.2606m</td><td style="text-align: center;">5.973</td></tr> <tr> <td style="text-align: center;">35</td><td style="text-align: center;">--</td><td style="text-align: center;">--</td><td style="text-align: center;">0.3116m</td><td style="text-align: center;">7.146</td></tr> <tr> <td style="text-align: center;">40</td><td style="text-align: center;">0.203</td><td style="text-align: center;">4.650</td><td style="text-align: center;">0.3399m</td><td style="text-align: center;">7.797</td></tr> <tr> <td 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0.5g$	--	--	0.241m,g	5.523	25	0.165	3.778	0.2606m	5.973	35	--	--	0.3116m	7.146	40	0.203	4.650	0.3399m	7.797	45	--	--	0.3657m	8.391	55	0.242	5.545	0.4216m	9.679	65	0.267	6.120	0.4769m	10.955	75	0.296	6.787	0.5344m	12.283	85	0.315	7.224	--	--	95	0.340	7.799	--	--	100	0.350g	8.029	0.68m,g	15.651			
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<b>METHOD/APPARATUS/PROCEDURE:</b> Equilibrium was attained after 1-2 hours of stirring when either hexahydrate or monohydrate was the saturating phase. The anhydrous salt reached equilibrium much more slowly, and in one case at a low temperature had not reached equilibrium after 6 hours of stirring. Representative points were checked by approach from supersaturation. Each reported value is the average of at least two closely agreeing determinations. Filtered samples of the solution were withdrawn with preheated calibrated pipets, and approximate densities were calculated. The iodate content was determined iodometrically.		<b>SOURCE AND PURITY OF MATERIALS:</b> $\text{Sr}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ was prepared by adding solns containing equivalent quantities of c.p. grade $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$ and $\text{HIO}_3$ in a large volume of water at 24°C. White finely crystalline $\text{Sr}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ settled rapidly and was washed by decantation until no test for $\text{Cl}^-$ ions was obtained. The salt air-dried to a fluffy white powder, and analysis by iodometry and loss in weight at 110°C showed 96.0% $\text{Sr}(\text{IO}_3)_2$ in $\text{Sr}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ . $\text{Sr}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$ was prepared in the same manner as the monohydrate, except that all solutions and washed water were cooled with ice. Drying with acetone produced a fluffy powder which contained 79.85% $\text{Sr}(\text{IO}_3)_2$ (calcd for $\text{Sr}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$ 80.18%). Anhydrous $\text{Sr}(\text{IO}_3)_2$ was obtained by heating either the mono- or hexahydrate to 110°C for a few hours, or by boiling them with water.																																																																																																						
<b>ESTIMATED ERROR:</b> Soly: the estimated accuracy is $\pm 0.005$ mass % for solns saturated with the anhydrous salt, and $\pm 0.0005$ mass% when the hydrates were present. Temp: the maximum variation never exceed $\pm 0.1^\circ\text{C}$ , and was usually much less.																																																																																																								

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Barium chlorate; Ba(ClO <sub>3</sub> ) <sub>2</sub> ; [13477-00-4]		Trautz, M.; Anschütz, A.		
(2) Water; H <sub>2</sub> O; [7732-18-5]		Z. Phys. Chem. 1906, 56, 236-42.		

## EXPERIMENTAL VALUES:

t/°C	Shaking time t/h	Barium Chlorate			Nature of the Solid Phase
		mass %	mol %	$m_1/\text{mol kg}^{-1}$ (compiler)	
-2.749 ± 0.004	4	15.32			
	4	15.24			
		(Av) 15.28	1.057	0.5928	--
0	7	16.88			
	7	16.91			
		(Av) 16.90	1.190	0.6685	--
10	14	21.24			
	14	21.22			
		(Av) 21.23	1.571	0.8859	--
20	40	25.54			
	14	25.57			
		(Av) 25.56	1.993	1.129	--
25	22	27.53			
	12	27.52			
		(Av) 27.53	2.200	1.249	Ba(ClO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O
30	24	29.45			
	24	29.40			
		(Av) 29.43	2.410	1.371	--
40	36	33.16			
	36	33.15			
		(Av) 33.16	2.854	1.631	--
50	14	36.68			
	14	36.70			
		(Av) 36.69	3.318	1.905	--
60	14	40.07			
	14	40.02			
		(Av) 40.05	3.805	2.196	Ba(ClO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O
70	14	43.04			
	14	43.05			
		(Av) 43.04	4.283	2.484	--
80	7	45.93			
	7	45.88			
		(Av) 45.90	4.784	2.789	--
90	8	48.67			
	8	48.73			
		(Av) 48.70	5.322	3.120	--
99.1	6	51.15			
	6	51.18			
		(Av) 51.17	5.843	3.444	--
104.6/740 mmHg (ca. 105.0 /760 mmHg)	4	52.63			
	4	52.70			
		(Av) 52.67	6.182	3.658	--

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Barium chlorate; Ba(ClO <sub>3</sub> ) <sub>2</sub> ; [13477-00-4]		Trautz, M.; Anschütz, A.		
(2) Water; H <sub>2</sub> O; [7732-18-5]		Z. Phys. Chem. 1906, 56, 236-42.		
VARIABLES:	PREPARED BY:			
$T/K = 270.401$ to 377.8	Hiroshi Miyamoto			
EXPERIMENTAL VALUES:				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE: Ba(ClO <sub>3</sub> ) <sub>2</sub> crystals and water were shaken in a thermostat at 10-90°C for 14 hours. Equilibrium at 100°C was established in a vapor of boiling water for 6-7 hours, (the temperature was checked the boiling point of pure water). Aliquots of saturated solution were removed by means of a pipet fitted with cotton wool. The solution was placed in a stoppered tube, and the sample was weighed. Ba(ClO <sub>3</sub> ) <sub>2</sub> was determined gravimetrically by evaporation of the solvent. After the solution saturated with the barium chlorate was frozen at near 0°C, the melted part of the solution was analyzed for the chlorate content, and the melting point of the frozen part was measured by using a Beckman thermometer. The chlorate content of solid phases at both 25 and 60°C was also determined.	SOURCE AND PURITY OF MATERIALS: Barium chlorate was purchased, and recrystallized several times.			
	ESTIMATED ERROR: Nothing specified			
	REFERENCES:			

COMPONENTS:	ORIGINAL MEASUREMENTS:																																															
(1) Barium bromate; Ba(BrO <sub>3</sub> ) <sub>2</sub> ; [13967-90-3]  (2) Water; H <sub>2</sub> O; [7732-18-5]	Trautz, M.; Anschütz, A. <i>Z. Phys. Chem.</i> 1906, 56, 236-42.																																															
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ESTIMATED ERROR: Solv: the deviations from the mean were about ± 5%. Temp: ± 0.04°C except eutectic point (authors)																																																
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(2) Water; H <sub>2</sub> O; [7732-18-5]		<i>Chem. Ind. (London)</i> <u>1971</u> , 543.																
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<sup>a</sup> From $K_{SO}^o = 4S^3 Y_{\pm}^3$ , using $-\log Y_{\pm} = Z_1 Z_2 A I^{1/2} - BI$ where A is from ref (1), and B 0.97 at 15°C, 0.85 at 30°C and 0.73 at 45°C.																		
The $K_{SO}^o$ data were fitted to the following equation																		
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The solubilities of Ba(BrO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O in water and in solutions of sodium chloride (0.015-0.50 mol dm <sup>-3</sup> ) were measured at twelve temperatures in the range 15-45°C in order to obtain the thermodynamic solubility products.	No information.																	
Saturated solutions of barium bromate were prepared by "static" method as described in ref (2), and were analyzed by titrating the barium ion with EDTA.	ESTIMATED ERROR:																	
	Nothing specified																	
	REFERENCES:																	
	1. Robinson, R. A.; Stokes, R. H. <i>Electrolyte Solutions</i> <u>1965</u> , 468, Butterworths, London. 2. Nezzal, G.; Popiel, W. J.; Vermande, P. <i>Chem. Ind. (London)</i> <u>1971</u> , 15, 543.																	

COMPONENTS: (1) Barium iodate; Ba(IO <sub>3</sub> ) <sub>2</sub> ; [10567-69-8] (2) Water; H <sub>2</sub> O; [7732-18-5]	ORIGINAL MEASUREMENTS: Trautz, M.; Anschütz, A. <i>Z. Physik. Chem.</i> 1906, 56, 236-42.																																									
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$t/^\circ C$ <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 40%; text-align: center;">Barium Iodate</th> <th style="width: 30%;"></th> </tr> <tr> <th style="text-align: right;">mass %</th> <th style="text-align: center;"><math>10^4 c_1/\text{mol dm}^{-3}</math></th> <th style="text-align: left;">(compiler)</th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">-0.046 ± 0.002 (eutectic point)</td> <td style="text-align: center;">0.008</td> <td style="text-align: right;">1.64</td> </tr> <tr> <td style="text-align: right;">+10</td> <td style="text-align: center;">0.014</td> <td style="text-align: right;">2.87</td> </tr> <tr> <td style="text-align: right;">20</td> <td style="text-align: center;">0.022</td> <td style="text-align: right;">4.52</td> </tr> <tr> <td style="text-align: right;">25</td> <td style="text-align: center;">0.028</td> <td style="text-align: right;">5.75</td> </tr> <tr> <td style="text-align: right;">30</td> <td style="text-align: center;">0.031</td> <td style="text-align: right;">6.37</td> </tr> <tr> <td style="text-align: right;">40</td> <td style="text-align: center;">0.041</td> <td style="text-align: right;">8.42</td> </tr> <tr> <td style="text-align: right;">50</td> <td style="text-align: center;">0.056</td> <td style="text-align: right;">11.5</td> </tr> <tr> <td style="text-align: right;">60</td> <td style="text-align: center;">0.074</td> <td style="text-align: right;">15.2</td> </tr> <tr> <td style="text-align: right;">70</td> <td style="text-align: center;">0.093</td> <td style="text-align: right;">19.1</td> </tr> <tr> <td style="text-align: right;">80</td> <td style="text-align: center;">0.115</td> <td style="text-align: right;">23.63</td> </tr> <tr> <td style="text-align: right;">90</td> <td style="text-align: center;">0.141</td> <td style="text-align: right;">28.99</td> </tr> <tr> <td style="text-align: right;">99.2/735mm (= ca 100/760mm)</td> <td style="text-align: center;">0.197</td> <td style="text-align: right;">40.52</td> </tr> </tbody> </table>		Barium Iodate		mass %	$10^4 c_1/\text{mol dm}^{-3}$	(compiler)	-0.046 ± 0.002 (eutectic point)	0.008	1.64	+10	0.014	2.87	20	0.022	4.52	25	0.028	5.75	30	0.031	6.37	40	0.041	8.42	50	0.056	11.5	60	0.074	15.2	70	0.093	19.1	80	0.115	23.63	90	0.141	28.99	99.2/735mm (= ca 100/760mm)	0.197	40.52
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METHOD/APPARATUS/PROCEDURE: Ba(IO <sub>3</sub> ) <sub>2</sub> crystals and water were shaken in a thermostat at 10-90°C for 14 hours. Equilibrium at 100°C was established in a vapor of boiling water for 6-7 hours, (the temperature was checked against the boiling point of pure water). Aliquots of saturated solutions were removed by means of a pipette fitted with cotton wool. The solution was placed in a stoppered tube and the sample was weighed. Ba(IO <sub>3</sub> ) <sub>2</sub> was determined gravimetrically by evaporation of the solvent. After the solution saturated with the barium iodate was frozen at near 0°C, the melted part of the solution was analyzed for the iodate content, and the melting point of the frozen part was measured by using a Beckmann thermometer.	SOURCE AND PURITY OF MATERIALS: Barium iodate was recrystallized from water. Other information was not given.																																									
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Solv: the deviations from the mean were about ± 5 % Temp: ± 0.04°C (authors)																																										
REFERENCES:																																										

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Barium iodate; $\text{Ba}(\text{IO}_3)_2$ ; [10567-69-8] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	Polessitskij, A. <i>C. R. Dokl. Acad. Sci. USSR</i> <u>1935</u> , 4, 193-6.
VARIABLES: $T/K = 273$ to $373$	PREPARED BY: Hiroshi Miyamoto

EXPERIMENTAL VALUES:	t/°C	Barium Iodate	
		$s_1/\text{mg dm}^{-3}$	$10^3 c_1/\text{mol dm}^{-3}$
	0	182	0.374
	15	305	0.626
	25	406.3	0.833
	40	580.0	1.19
	50	727	1.49
	60	873	1.79
	70	1070	2.196
	78	1300	2.669
	100	1840	3.777

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
$\text{Ba}(\text{IO}_3)_2$ crystals were stirred with water in a thermostat for 24 hours. After settling the solutions for one hour, samples were withdrawn with a pipet with cotton-wool. The solubilities at high temperatures were determined in a special apparatus which facilitates to keep the saturated solutions at a constant temperature by the vapor of a boiling liquid ( $\text{H}_2\text{O}-100^\circ\text{C}$ . $\text{C}_2\text{H}_5\text{OH}-78^\circ\text{C}$ ). Three analytical methods were used: (1) Evaporation of $200 \text{ cm}^3$ of the solution and drying at $90^\circ\text{C}$ , (2) Determination of Ba as $\text{BaSO}_4$ from $200 \text{ cm}^3$ of the solution, (3) Iodometric titration of $\text{IO}_3^-$ .	$\text{Ba}(\text{IO}_3)_2$ was prepared by adding recrystallized $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ to an equivalent amount of $\text{KIO}_3$ . The precipitate was filtered off and washed with hot water, or washed by decantation with a large amount of cold water, under strong stirring.
	ESTIMATED ERROR:
	Solv: three analytical methods gave the same results within $\pm 3\%$ . Temp: not given.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Barium iodate; Ba(IO <sub>3</sub> ) <sub>2</sub> ; [10567-69-8]	Bousquet, J.; Mathurin, D.; Vermande, P.
(2) Water; H <sub>2</sub> O; [7732-18-5]	Bull. Soc. Chim. Fr. 1969, 1111-5.
VARIABLES:	PREPARED BY:
T/K = 273 to 359	Hiroshi Miyamoto

EXPERIMENTAL VALUES: t/°C	Barium Iodate	
	monohydrate $10^{10} K_{s0}^{\circ}/\text{mol}^3 \text{dm}^{-3}$	anhydride $10^9 K_{s0}^{\circ}/\text{mol}^3 \text{dm}^{-3}$
0	1.828	
8	3.936	
17	8.84	
25	16.0	
30	24.55	
40		4.57
50		7.77
60		13.3
70		22.5
79		32.9
86		46.5

The solubility product,  $K_{s0}^{\circ}$ , of Ba(IO<sub>3</sub>)<sub>2</sub>·xH<sub>2</sub>O was given in the following:

$$K_{s0}^{\circ} = (C_{\text{Ba}}^{2+} \times C_{\text{IO}_3^-}^2) (Y_{\text{Ba}}^{2+} \times Y_{\text{IO}_3^-}^2) \\ = 4S^3 Y_{\pm}^3 \quad (1)$$

where S represents solubility of iodate,  $Y_{\pm}$  is an activity coefficient, and is given by modified Debye-Hückel equation

$$-\log Y_{\pm} = Z_+ Z_- A \sqrt{I} - BI \quad (2)$$

From (1) and (2)

$$Y = -BI + 1/3 \log K_{s0}^{\circ} \quad (3)$$

where  $Y = 1/3 \log (4S^3) - Z_+ Z_- A \sqrt{I}$ , and  $A = 0.5115$  at 25°C.

Solubility product ( $K_{s0}^{\circ}$ ) and unknown constant (B) are evaluated from the intercept and the slope of Y vs I plots. The solubilities of Ba(IO<sub>3</sub>)<sub>2</sub> in aqueous NaCl solutions were determined in order to obtain Y vs I plots, but the data of solubilities were not given in the paper.

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Aqueous NaCl solutions and the specified hydrated crystals were placed into glass-stoppered Erlenmeyer flasks. The flasks were stirred in a thermostat for 1-15 hours. The iodate content was determined iodometrically.	BDH labeled Ba(IO <sub>3</sub> ) <sub>2</sub> ·H <sub>2</sub> O was used. The anhydride was prepared from the monohydrate by dehydration at 200°C.
	ESTIMATED ERROR: Soly: nothing specified Temp: ± 0.05°C (authors)
	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:																																																															
(1) Barium iodate; $\text{Ba}(\text{IO}_3)_2$ ; [10567-69-8]		Jones, A. L.; Madigan, G. A.; Wilson, I. R.																																																															
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VARIABLES:		PREPARED BY:																																																															
Four crystal types $T/K = 275.2, 283.2$ and $298.2$		Hiroshi Miyamoto																																																															
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<p><sup>a</sup> The preparations of the crystal types A, B and C are given in (A), (B) and (C) in "Source and purity of materials." The primary precipitate (<math>5-50 \mu\text{m}</math> size) in preparation of barium iodate is named "P".</p> <p><sup>b</sup> Two series of the conductivity measurements were carried out in this study. The details of the method are described in "Method: I and II."</p> <p><sup>c</sup> The mean solubilities were transformed to solubility products with values of the mean ionic activity coefficient calculated from Davies modification of the Gunterberg equation (1).</p>																																																																	
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A conductivity method was used. Conductances were measured at $1592 \text{ Hz}$ with a Wayne-Kerr conductance bridge accurate to $0.1\%$ full scale. Two series of measurements were made. In those of series I, the conductivity was monitored until a small, constant, rate of increase was found, similar to that expected for glass dissolution from separate experiments. Extrapolation of this constant rate to zero time gave the value taken as the solubility. In series II, the conductivity was followed similarly until within ca. $0.25\%$ of the expected equilibrium value. The temperature was then raised by ca. $2 \text{ K}$ until the conductivity rose by ca. $8\%$ , due to the increases in molar conductivity and in solubility. The temperature was then restored to its initial value, continued . . .	Finely divided barium iodate ( $5-50 \mu\text{m}$ ) was prepared by pouring barium chloride solution ( $200 \text{ cm}^3$ ; $0.05 \text{ mol dm}^{-3}$ ) and potassium iodate solution ( $200 \text{ cm}^3$ ; $0.1 \text{ mol dm}^{-3}$ ) simultaneously into $600 \text{ cm}^3$ distilled water, with continuous stirring. The precipitate was washed many times by decantation, using conductivity water. Large crystals were prepared by the following three methods: (A) The precipitate was dissolved in conductivity water at $80-85^{\circ}\text{C}$ to produce an approximately saturated solution. After filtration, the solution was allowed to cool slowly. The crystals formed appeared to be cubes truncated corners, of linear dimension $50-150 \mu\text{m}$ . (B) The method was similar to A but used nitric acid ( $1 \text{ mol dm}^{-3}$ ) as solvent. The product contained continued . . .																																																																

<b>COMPONENTS:</b> (1) Barium iodate; $\text{Ba}(\text{IO}_3)_2$ ; [10567-69-8] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b> Jones, A. L.; Madigan, G. A.; Wilson, I. R. <i>J. Cryst. Growth</i> <u>1973</u> , <u>20</u> , 99-102.
AUXILIARY INFORMATION	
<b>METHOD/APPARATUS/PROCEDURE:</b> continued . . . and the conductivity began to fall. Extrapolation of measurements after this, to zero rate, again gave an estimate of solubility. In measurements of series II, it was difficult to make an accurate estimate of conductivity changes due to glass dissolution. Blank experiments and comparison of series I and II agree in suggesting that they are almost negligible. The concentration of barium iodate was calculated from conductivity measurements using the method of Righellato and Davies (2).	<b>SOURCE AND PURITY OF MATERIALS:</b> continued crystals up to 0.5 mm in size. (C) $\text{Ba}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$ in granular form is obtained by the reaction in solution of barium ion with iodate ion formed by the slow reduction of periodic acid by lactic acid at room temperature. In separate preparations this gave truncated cubes of side 0.3 to 0.8 mm, and flattened cubes, 0.8 to 3 mm long and 0.4 to 0.8 mm thick. Before use all crystals were aged for at least 2 weeks under conductivity water, with several changes of water. <b>ESTIMATED ERROR:</b> Soly: Standard deviation 0.02 at 25 °C. Temp.: ± 0.03 K (authors)

<b>COMPONENTS:</b>	<b>ORIGINAL MEASUREMENTS:</b>
(1) Barium iodate; $\text{Ba}(\text{IO}_3)_2$ ; [10567-69-8]	Federov, V. A.; Robov, A. M.; Shmyd'ko, I. I.; Vorontsova, N. A.; Mironov, V. E.
(2) Lithium nitrate; $\text{LiNO}_3$ ; [7790-69-4]	
(3) Lithium perchlorate; $\text{LiClO}_4$ ; [7791-03-9]	<i>Zh. Neorg. Khim.</i> 1974, 19, 1746-50; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> 1974, 19, 950-3.
(4) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	

<b>VARIABLES:</b>	<b>PREPARED BY:</b>
$T/K = 298$ Ionic Strength	Hiroshi Miyamoto

<b>EXPERIMENTAL VALUES:</b>		Barium Iodate				
$t/^\circ\text{C}$	$c_2/\text{g-ion dm}^{-3}$	$10^3 c_1/\text{mol dm}^{-3}$				
		I = 0.5	1.0	2.0	3.0	4.0
25	0	1.63	1.84	2.09	2.28	2.16
	0.1	1.68	--	--	--	--
	0.2	1.76	2.04	2.30	--	--
	0.3	1.88	--	--	--	--
	0.4	2.04	2.22	--	2.68	2.68
	0.5	2.22	--	2.62	--	--
	0.6		2.37	--	--	--
	0.8		2.59	2.94	3.10	3.20
	1.0		2.77	3.16	--	--
	1.2			--	3.56	3.74
	1.3			3.48	--	--
	1.5			3.70	--	--
	1.6			--	4.06	4.30
	1.8			4.00	--	--
	2.0			4.20	4.47	4.90
	2.4				5.17	5.50
	2.8				5.76	6.15
	3.0				6.07	--
	3.2					6.78
	3.6					7.47
	4.0					8.14

**AUXILIARY INFORMATION**

<b>METHOD/APPARATUS/PROCEDURE:</b> Equilibrium between the solid phase and the solution was reached by vigorous agitation with a magnetic stirrer in stoppered vessels in a thermostat. Equilibrium was established after stirring for 4-6 hours and was checked by removing specimens after equal intervals of time. The concentrations for $\text{Ba}(\text{IO}_3)_2$ in the saturated solutions were determined iodometrically.	<b>SOURCE AND PURITY OF MATERIALS:</b> The author stated that $\text{Ba}(\text{IO}_3)_2$ was made by well-known method, but the details of the method were not given. Chemically pure grade $\text{LiClO}_4$ and $\text{LiNO}_3$ used were recrystallized from twice-distilled water. Before recrystallization, the solutions were boiled with active carbon.
	<b>ESTIMATED ERROR:</b> Solv: the reproducibility of the results averages $\pm 1.5 - 2\%$ Temp: not given
	<b>REFERENCES:</b>