

COMPONENTS: (1) Beryllium perchlorate; $\text{Be}(\text{ClO}_4)_2$; [13597-95-0] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzhurinsky, B.F. <i>Zh. Obshchei Khim.</i> <u>1956</u> , 26, 1549-53; * <i>J. Gen. Chem. USSR</i> <i>(Engl. Transl.)</i> <u>1956</u> , 26, 1733-7.																																										
VARIABLES: Temperature: 273 - 323 K	PREPARED BY: C.Y. Chan																																										
EXPERIMENTAL VALUES:																																											
Solubility of beryllium perchlorate in water at various temperatures, the solid phase being $\text{Be}(\text{ClO}_4)_2 \cdot 4\text{H}_2\text{O}$:																																											
<table> <thead> <tr> <th>t/°C</th> <th>mol %^a</th> <th>molality/mol kg⁻¹</th> <th>t/°C</th> <th>mol %^a</th> <th>molality/mol kg⁻¹</th> </tr> </thead> <tbody> <tr><td>0</td><td>12.62</td><td>8.02</td><td>30</td><td>12.99</td><td>8.29</td></tr> <tr><td>5</td><td>12.71</td><td>8.08</td><td>35</td><td>13.08</td><td>8.35</td></tr> <tr><td>10</td><td>12.73</td><td>8.10</td><td>40</td><td>13.21</td><td>8.45</td></tr> <tr><td>15</td><td>12.82</td><td>8.16</td><td>45</td><td>13.25</td><td>8.48</td></tr> <tr><td>20</td><td>12.87</td><td>8.20</td><td>50</td><td>13.31</td><td>8.52</td></tr> <tr><td>25</td><td>12.95</td><td>8.26</td><td></td><td></td><td></td></tr> </tbody> </table>	t/°C	mol % ^a	molality/mol kg ⁻¹	t/°C	mol % ^a	molality/mol kg ⁻¹	0	12.62	8.02	30	12.99	8.29	5	12.71	8.08	35	13.08	8.35	10	12.73	8.10	40	13.21	8.45	15	12.82	8.16	45	13.25	8.48	20	12.87	8.20	50	13.31	8.52	25	12.95	8.26				
t/°C	mol % ^a	molality/mol kg ⁻¹	t/°C	mol % ^a	molality/mol kg ⁻¹																																						
0	12.62	8.02	30	12.99	8.29																																						
5	12.71	8.08	35	13.08	8.35																																						
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^a Compiler's calculations.																																											
AUXILIARY INFORMATION																																											
METHOD/APPARATUS/PROCEDURE: The solid tetrahydrate was stirred continuously with solvent in the solubilization chamber of the solv apparatus (sketch given in original publication) which was placed in a "Hoppler ultrathermostat". Solution samples were suction-filtered through a porous filter and forced into small weighed glass containers using a rubber bulb-and-tube arrangement. Perchlorate was analysed by precipitation as KClO_4 in anhy. alcohol (ref.1). The time required for saturation equilibrium was 1-4 h, as determined by successive withdrawal of samples at various time intervals for analysis. Solid samples were withdrawn from the solv chamber with a glass sleeve, pressed with filter paper between metal plates which were heated or cooled to approx. the temperature of the solv determination. The weighed samples were then analysed for perchlorate.	SOURCE AND PURITY OF MATERIALS: $\text{Be}(\text{ClO}_4)_2 \cdot 4\text{H}_2\text{O}$ was prepared by dissolving "pure grade" BeCO_3 in the equivalent amount of HClO_4 followed by 2-3 recrystallizations. Source and purity not stated.																																										
ESTIMATED ERROR: Not stated. Precision in solv probably $\pm 0.02 \text{ mol kg}^{-1}$ (compiler).																																											
REFERENCES: <ol style="list-style-type: none"> Chaney, A.L.; Mann, A. <i>J. Phys. Chem.</i> <u>1931</u>, 35, 2289. 																																											
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Beryllium Perchlorate

COMPONENTS: (1) Beryllium perchlorate; Be(ClO ₄) ₂ ; [13597-95-0] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzhurinsky, B.F. <i>Zh. Obshchey Khim.</i> <u>1956</u> , 26, 1549-53; *J. Gen. Chem. USSR (Engl. Transl.) <u>1956</u> , 26, 1733-7.
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EXPERIMENTAL VALUES:(continued)

COMMENTS AND/OR ADDITIONAL DATA

The authors reported a linear plot of $\log x$ versus $(T/K)^{-1}$, where x was the mol fraction of Be(ClO₄)₂.4H₂O as the solute. A linear least squares analysis of their data (compiler) gave a value of -0.9920 for the correlation coefficient and the best-fit equation as follows:

$$\ln x = A (T/K)^{-1} + B$$

where x = mol fraction of Be(ClO₄)₂, $A = -95.0$ and $B = -1.724$. The std. deviations in A and B were 4.0 and 0.014 respectively. Within the temperature range studied, this equation gives calculated solubility values to within $\pm 0.3\%$ of the observed values of x .

COMPONENTS: (1) Beryllium perchlorate; Be(ClO ₄) ₂ ; [13597-95-0] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Sidgwick, N.V.; Lewis, N.B. <i>J. Chem. Soc.</i> 1926, 1287-1302.
VARIABLES: Temperature: 273 - 323 K	PREPARED BY: C.Y. Chan
EXPERIMENTAL VALUES:	
<p>The solubility of beryllium perchlorate in water at 25°C was 59.5 g(1)/100g sln., the solid phase being Be(ClO₄)₂.4H₂O; [7787-48-6]. The corresponding mol% and molality values (compiler's calculations) are 11.30% and 7.07 mol kg⁻¹.</p>	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: No details given.	SOURCE AND PURITY OF MATERIALS: Not stated.
	ESTIMATED ERROR: Not stated.
	REFERENCES:

COMPONENTS: (1) Magnesium perchlorate; Mg(ClO ₄) ₂ ; [10034-81-8] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzhurinsky, B.F. <i>Zh. Obshchey Khim. U.S.S.R.</i> <u>1956</u> , 26, 1549-53; * <i>J. Gen. Chem. U.S.S.R. (Engl. Transl.)</i> <u>1956</u> , 26, 1733-7.
VARIABLES: Temperature: 273-323 K	PREPARED BY: K.H. Khoo

EXPERIMENTAL VALUES:

Solubility of Mg(ClO₄)₂ in water : Solid phase = Mg(ClO₄)₂.6H₂O

t/°C	soly /mol kg ⁻¹	t/°C	soly /mol kg ⁻¹
0	4.10	30	4.57
5	4.20	35	4.68
10	4.26	40	4.72
15	4.34	45	4.79
20	4.44	50	4.89
25	4.48		

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: The salt was stirred with water in a thermostat. Equilibrium was reached after continuous stirring for 1-4 h. Approach to equilibrium from above or below had no effect. Magnesium was determined by precipitation as the sulfate [1]. The composition of the solid phase was determined at the same time as the solubility by pressing a sample with filter paper between metal plates kept at about the same temperature as the solution.	SOURCE AND PURITY OF MATERIALS: Mg(ClO ₄) ₂ was prepared by saturating HClO ₄ with MgO (analytically pure grade) and recrystallized twice or thrice from solution. The purity of the salt was not stated.
	ESTIMATED ERROR: Not stated.
	REFERENCES: 1. Kolthoff, I.M.; Lundell, G.E., <i>Quantitative Analysis</i> , <u>1948</u> , 772.

Magnesium Perchlorate

COMPONENTS: (1) Magnesium perchlorate; Mg(ClO ₄) ₂ ; [10034-81-8] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Willard, H.H.; Smith, G.F. <i>J. Am. Chem. Soc.</i> , <u>1923</u> , 45, 286-96.					
VARIABLES: One temperature: 298.15 K	PREPARED BY: C.Y. Chan					
EXPERIMENTAL VALUES:						
Solubility ^a of magnesium perchlorate in water at 25.00°C :						
mass %	g/100 cm ³	sln.	mol %	mol dm ⁻³	mol kg ⁻¹	sat. sln. density/g cm ⁻³
49.90	73.453		7.441 ^b	3.294 ^b	4.462 ^b	1.4720
^a The solid phase was a mixture of the anhydrous salt and the hydrate (not specified) that had crystallized from the saturated solution.						
^b Compiler's calculations.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE: A sat. sln. of the salt was prepared at a temperature slightly above 25°C and sealed together with about 1 g of the anhydrous salt in a solubility tube, capacity 18-20 cm ³ . This tube was then rotated end-over-end in the thermostat bath at 25.00°C for 24-48h and stood vertically to allow the solids to settle. Samples of the clear sat. sln. were then analysed for solute content by an evaporation-to-dryness method using Pt crucibles. The salt was dried to constant wt. at 250°C in a current of air dried with P ₂ O ₅ . Duplicate soly determinations were made, those analyses in which chloride (from thermal decomposition) was found present being rejected. The equilibrium solid phase was a mixture of the anhydrous salt and its hydrate.	SOURCE AND PURITY OF MATERIALS: Anhydrous magnesium perchlorate was prepared as described in ref.1 .					
ESTIMATED ERROR: Precision in temp. was $\pm 0.01^\circ\text{C}$; precision in soly. about $\pm 0.05\%$.						
REFERENCES: 1. Willard, H.H.; Smith, G.F. <i>J. Am. Chem. Soc.</i> , <u>1922</u> , 44, 2816.						

COMPONENTS: (1) Calcium perchlorate; $\text{Ca}(\text{ClO}_4)_2$; [17477-36-6] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzhurinsky, B.F. <i>Zhur. Obshchey Khim.</i> <u>1956</u> , 26, 1549-53; * <i>J. Gen. Chem. USSR</i> (<i>Engl. Transl.</i>) <u>1956</u> , 26, 1733-7.
VARIABLES: Temperature: 273 - 323 K	PREPARED BY: C.Y. Chan

EXPERIMENTAL VALUES:

Solubility^a of calcium perchlorate in water at various temperatures :

$t/\text{^o C}$: 0	5	10	15	20	25	30
$s/\text{mol kg}^{-1}$: 7.10	7.29	7.51	7.67	7.91	8.18	8.46
mol % ^b	: 11.34	11.61	11.92	12.14	12.47	12.84	13.23
$t/\text{^o C}$: 35	40	45	50			
$s/\text{mol kg}^{-1}$: 8.76	8.88	9.29	9.50			
mol % ^b	: 13.63	13.79	14.34	14.61			

^a Solid phase/phases not specified.^b Compiler's calculations.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solid perchlorate, presumably hydrated (compiler), was stirred continuously with water in the solv apparatus (sketch given in original paper) in a Hoppler ultra-thermostat. Solution samples were suction-filtered and forced into small weighed glass containers with the help of a rubber bulb-and-tube arrangement. Samples were analysed for Ca by the sulfate method (ref.1). The time required for attainment of equilibrium was 1-4h, determined by successive withdrawal of samples at various time interval for analysis. Solid samples were withdrawn with a glass sieve and pressed with filter paper between metal plates heated or cooled to approx. the temp. of determination. The weighed samples were then analysed for Ca.

SOURCE AND PURITY OF MATERIALS:

(1) was prepared by saturating perchloric acid with analytically pure grade calcium oxide, followed by 2-3 recrystallizations from solution. Purity of the acid and sources of chemicals not given.

ESTIMATED ERROR:

Not available.

REFERENCES:

1. Kolthoff, I.M.; Lundell, E.V. *Quantitative Analysis* (State Chemical Press 1948), 772.

Calcium Perchlorate

COMPONENTS: (1) Calcium perchlorate; $\text{Ca}(\text{ClO}_4)_2$; [17477-36-6] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Willard, H.H.; Smith, G.F. <i>J. Am. Chem. Soc.</i> 1923, 45, 286-96.				
VARIABLES: One temperature: 298.15 K	PREPARED BY: C.Y. Chan				
EXPERIMENTAL VALUES:					
Solubility ^a of calcium perchlorate in water at 25.00°C :					
mass %	g/100 cm ³ sln.	mol %	mol dm ⁻³	mol kg ⁻¹	sat. sln. density/g cm ⁻³
65.35	112.34	12.45 ^b	4.701 ^b	7.892 ^b	1.7191
^a The solid phase was a mixture of the anhydrous salt and its tetrahydrate, $\text{Ca}(\text{ClO}_4)_2 \cdot 4\text{H}_2\text{O}$.					
^b Compiler's calculations.					
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE: A sat. sln. of the salt was prepared at a temperature slightly above 25°C and sealed together with about 1 g of the anhydrous salt in a solubility tube, capacity 18-20 cm ³ . This tube was then rotated end-over-end in the thermostat bath at 25.00°C for 24-48 h and stood vertically to allow the solids to settle. Samples of the clear sat. sln. were then analysed for solute content by an evaporation-to-dryness method using Pt crucibles. The salt was dried to constant wt. at 250°C in a current of air dried with P ₂ O ₅ . Duplicate solv. determinations were made, those analyses in which chloride (from thermal decomposition) was found present being rejected. The equilibrium solid phase was a mixture of the anhydrous salt and its hydrate.	SOURCE AND PURITY OF MATERIALS: Hydrated (1) was prepared from twice-recrystallized calcium nitrate and purified HClO ₄ (ref.1). Anhyd. (1) obtained by heating the hydrate to const. wt. at 250°C.				
ESTIMATED ERROR: Precision in temp. was $\pm 0.01^\circ\text{C}$; precision in solv. about $\pm 0.05\%$.					
REFERENCES: 1. Willard, H.H. <i>J. Am. Chem. Soc.</i> 1912, 34, 1480.					

COMPONENTS: (1) Strontium perchlorate; Sr(ClO ₄) ₂ ; [13450-97-0] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzhurinsky, B.F. <i>Zh. Obshchei Khim.</i> <u>1956</u> , 26, 1549-53; * <i>J. General Chem.</i> <i>U.S.S.R. (Engl. Transl.)</i> <u>1956</u> , 26, 1733-7.
VARIABLES: Temperature/K: 273-313	PREPARED BY: K.H. Khoo
EXPERIMENTAL VALUES:	
Solubility of Sr(ClO ₄) ₂ (s) in water at various temperatures (T)	
T/ °C s/mol kg ⁻¹	0 5 10 15 20 25 30 35 40 8.16 8.57 9.03 9.49 10.10 10.54 11.43 12.02 12.70
Note: The solid phase is Sr(ClO ₄) ₂ .4H ₂ O at temperatures below 25.7°C; above this temperature, the solid phase is Sr(ClO ₄) ₂ .3H ₂ O.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: The salt was stirred with water in a thermostat. Equilibrium was reached after continuous stirring for 1-4 h. Owing to the great tendency of the salt to form super-saturated solutions, equilibrium was approached from below. Strontium was determined by precipitation as sulfate [1]. The composition of the solid phase was determined at the same time as the solubility by pressing a sample with filter paper between metal plates kept at about the temperature of the solution. In most cases, the excess of adsorbed water was 0-6 mol % of the total amount of water of crystallization.	SOURCE AND PURITY OF MATERIALS: Sr(ClO ₄) ₂ was prepared by saturating perchloric acid with SrO (analytically pure grade) and recrystallized twice or thrice from solution. The purity of the salt was not stated.
	ESTIMATED ERROR: Not stated.
	REFERENCES: 1. Kolthoff, I.M.; Lundell, G.E. <i>Quantitative Analysis.</i> <u>1948</u> , 772.

COMPONENTS: (1) Strontium perchlorate; Sr(ClO ₄) ₂ ; [13450-97-0] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Willard, H.H.; Smith, G.F. <i>J. Am. Chem. Soc.</i> <u>1923</u> , 45, 286-96.
VARIABLES: One temperature: 298.15 K	PREPARED BY: C.Y. Chan

EXPERIMENTAL VALUES:

Solubility^a of strontium perchlorate in water at 25.00°C :

mass %	g/100 cm ³	sln	mol %	mol dm ⁻³	mol kg ⁻¹	sat. sln.	density/g cm ⁻³
75.59	157.51		16.297 ^b	5.497 ^b	10.808 ^b	2.0837	

^a The solid phase was a mixture of the anhydrous salt and its hydrate which was not analysed. The authors reported that when strontium perchlorate was crystallized at about 25°C the dihydrate was obtained. This observation is in error and the solid phase was probably Sr(ClO₄)₂.4H₂O .

^b Compiler's calculations.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: A sat. sln. of the salt was prepared at a temperature slightly above 25°C and sealed together with about 1 g of the anhydrous salt in a solubility tube, capacity 18-20 cm ³ . This tube was then rotated end-over-end in the thermostat bath at 25.00°C for 24-48h and stood vertically to allow the solids to settle. Samples of the clear sat. sln. were then analysed for solute content by an evaporation-to-dryness method using Pt crucibles. The salt was dried to constant wt. at 250°C in a current of air dried with P ₂ O ₅ . Duplicate solv. determinations were made, those analyses in which chloride (from thermal decomposition) was found present being rejected.	SOURCE AND PURITY OF MATERIALS: Hydrated (1) was prepared from twice-recrystallized strontium nitrate and purified HClO ₄ (ref.1). Anhyd. (1) obtained by heating the hydrate to const. wt. at 250°C.
ESTIMATED ERROR: Precision in temp. was $\pm 0.01^\circ\text{C}$; precision in solv. about $\pm 0.05\%$.	
REFERENCES: 1. Willard, H.H. <i>J. Am. Chem. Soc.</i> <u>1912</u> , 34, 1480.	

COMPONENTS: (1) Barium perchlorate; $\text{Ba}(\text{ClO}_4)_2$; [13465-95-7] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Lilich, L.S.; Dzurinsky, B.F. <i>Zh. Obshchei Khim.</i> <u>1956</u> , <u>26</u> , 1549-53; * <i>J. General Chem.</i> <i>U.S.S.R. (Engl. Transl.)</i> <u>1956</u> , <u>26</u> , 1733-7.
VARIABLES: Temperature/K: 273, 293 and 313 Composition	PREPARED BY: K.H. Khoo

EXPERIMENTAL VALUES:

The solubility of $\text{Ba}(\text{ClO}_4)_2$ in water is expressed as the number of moles of anhydrous salt per kilogram of water as follows:

t/ $^{\circ}\text{C}$	soly/mol kg $^{-1}$
0	4.11
20	5.29
40	6.13

The solid phase is not stated, but is likely to be $\text{Ba}(\text{ClO}_4)_2 \cdot 3\text{H}_2\text{O}$ (compiler).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE The salt was stirred with water in a thermostat. Equilibrium was established after continuous stirring for 1-4 h. Approach to equilibrium from above or below had no effect. No information is given on analysis of the saturated solutions and the nature of the solid phase.	SOURCE AND PURITY OF MATERIALS: Nothing specified.
	ESTIMATED ERROR: Nothing specified.
	REFERENCES: None.

Barium Perchlorate

COMPONENTS: (1) Barium perchlorate; Ba(ClO ₄) ₂ ; [13465-95-7] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Willard, H.H.; Smith, G.F. <i>J. Am. Chem. Soc.</i> , 1923, 45, 286-96.					
VARIABLES: One temperature: 298.15 K	PREPARED BY: C.Y. Chan					
EXPERIMENTAL VALUES:						
Solubility ^a of barium perchlorate in water at 25.00°C :						
mass %	g/100 cm ³	sln.	mol %	mol dm ⁻³	mol kg ⁻¹	sat. sln.
						density/g cm ⁻³
66.48	128.99		9.606 ^b	3.8362 ^b	5.898 ^b	1.9403
^a The solid phase was a mixture of the anhydrous salt and the hydrate (not specified) that had crystallized from the saturated solution.						
^b Compiler's calculations.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE: A sat. sln. of the salt was prepared at a temperature slightly above 25°C and sealed together with about 1 g of the anhydrous salt in a solubility tube, capacity 18-20 cm ³ . This tube was then rotated end-over-end in the thermostat bath at 25.00°C for 24-48h and stood vertically to allow the solids to settle. Samples of the clear sat. sln were then analysed for solute content by an evaporation-to-dryness method using Pt crucibles. Duplicate soly determinations were made, those analyses with chloride (from thermal decomposition) found present being rejected.	SOURCE AND PURITY OF MATERIALS: Hydrated barium perchlorate was prepared from very pure barium chloride and purified HClO ₄ (ref.1) and recrystallized twice. The anhy. salt was obtained by heating the hydrate at 250°C in a current of dry air to constant weight.					
ESTIMATED ERROR: Precision in temp. was ±0.01°C; precision in soly. about ±0.05% .						
REFERENCES: 1. Willard, H.H.; <i>J. Am. Chem. Soc.</i> , 1912, 34, 1480.						