

COMPONENTS: (1) Lithium chlorate: LiClO_3 ; [13453-71-9] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Mylius, F.; Funk, R. <i>Ber. Dtsch. Chem. Ges.</i> <u>1897</u> , 30, 1716-25.						
VARIABLES: T/K = 291	PREPARED BY: Hiroshi Miyamoto						
EXPERIMENTAL VALUES: <p style="text-align: center;">The solubility of LiClO_3 in water at 18°C is given:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">75.8 mass %</td> <td>(authors)</td> </tr> <tr> <td style="padding-right: 20px;">313.5 g/100 g H_2O</td> <td>(authors)</td> </tr> <tr> <td style="padding-right: 20px;">34.7 mol kg^{-1}</td> <td>(compiler)</td> </tr> </table> <p style="text-align: center;">The density of the saturated solution was given as</p> <p style="text-align: center;">1.814 g cm^{-3}</p>		75.8 mass %	(authors)	313.5 g/100 g H_2O	(authors)	34.7 mol kg^{-1}	(compiler)
75.8 mass %	(authors)						
313.5 g/100 g H_2O	(authors)						
34.7 mol kg^{-1}	(compiler)						
AUXILIARY INFORMATION							
METHOD/APPARATUS/PROCEDURE: The salt and water were placed in a bottle and agitated in a constant temperature bath for a long time (time not specified). After the saturated solution settled, aliquots for analyses were withdrawn with a pipet. LiClO_3 was determined by evaporation to dryness.	SOURCE AND PURITY OF MATERIALS: The salt was stated to be of a "pure grade", and trace impurities stated to be absent. ESTIMATED ERROR: Soly: precision within 1 %. Temp: nothing specified. REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:			
(1) Lithium chlorate; LiClO_3 ; [13453-71-9]		Kraus, C.A.; Burgess, W.M.			
(2) Water; H_2O ; [7732-18-5]		J. Am. Chem. Soc. <u>1927</u> , 49, 1226-35.			
VARIABLES:		PREPARED BY:			
T/K = 234.1 to 400.8		Hiroshi Miyamoto and Mark Salomon			
EXPERIMENTAL VALUES:					
t/°C	Water mass %	Lithium mass % (compiler)	Chlorate mol % (compiler)	mol kg ⁻¹ (compiler)	Nature of the
- 8.7	84.24	15.76	3.595	2.070	Ice
-13.2	79.27	20.73	4.954	2.893	"
-15.2	77.37	22.63	5.508	3.236	"
-17.4	75.56	24.44	6.056	3.578	"
-19.9	73.30	26.70	6.768	4.030	"
-23.3	71.32	28.68	7.420	4.449	"
-26.2	69.67	30.33	7.984	4.816	"
-30.5	67.29	32.71	8.832	5.378	"
-36.6	64.62	35.38	9.838	6.057	"
-39.1	63.27	36.73	10.37	6.422	"
-39.0	62.58	37.42	10.65	6.615	$\text{LiClO}_3 \cdot 3\text{H}_2\text{O}$
-37.1	61.9	38.1	10.9	6.81	"
-33.9	60.95	39.05	11.32	7.088	"
-15.7	54.65	45.35	14.19	9.180	"
- 8.8	52.06	47.94	15.51	10.19	"
- 7.3	51.04	48.96	16.05	10.61	"
- 4.8	49.51	50.49	16.89	11.28	"
- 1.8	48.05	51.95	17.73	11.96	"
+ 0.5	46.73	53.27	18.51	12.61	"
2.2	45.43	54.57	19.32	13.29	"
4.8	43.34	56.66	20.67	14.46	"
6.1	41.84	58.16	21.69	15.38	"
7.3	39.85	60.15	23.13	16.70	"
continued.....					
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
Solubilities were determined by thermal analysis (cooling curves). A weighed quantity of salt (12-28 g) was placed in a tube which was sealed with a rubber stopper. The stopper was fitted with a mercury sealed stirrer, a nitrogen inlet, an inlet to permit additions of water from a pycnometer with a long delivery tube, and a copper-constantan thermocouple. The solubility tube was fitted with an air jacket, and the apparatus placed in an oil or water thermostat. Nitrogen was passed through the upper part of the tube during additions of water, and experiments were carried with a slight excess pressure of N_2 . After the determination of the melting point of the anhydrous salt, successive known quantities of water were added, and the solution cooled to obtain precipitation. Four independent series of experiments were carried out.			Lithium chlorate solutions were prep'd by slowly adding a 5.5 N solution of barium chlorate to a 4.5 N solution of lithium sulfate, both solutions being near the boiling point. The pptd BaSO_4 was removed by filtration, and the filtrate treated with barium chlorate and sulfate to insure equivalence of LiClO_3 . LiClO_3 was pptd from the filtrate in several steps by slowly evaporating the solvent in vacuum over P_2O_5 . Care was taken to prevent the salt in the highly concentrated solution (around 90 % of salt) from decomposing by keeping the temp below 50°C. The resulting salt was pulverized and finally dried in a desiccator over P_2O_5 under high vacuum.		
			Lithium sulfate prep'd from the recrystd carbonate with sulfuric acid. The ppt was washed and dried at 130°C. Barium chlorate of the highest obtainable purity was recrystd from water several times and was dried at 130°C.		
			ESTIMATED ERROR:		
			Nothing specified.		

COMPONENTS:		ORIGINAL MEASUREMENTS:			
(1) Lithium chlorate; LiClO_3 ; [13453-71-9]		Kraus, C.A.; Burgess, W.M.			
(2) Water; H_2O ; [7732-18-5]		J. Am. Chem. Soc. <u>1927</u> , 49, 1226-35.			
EXPERIMENTAL VALUES: (Continued)					
t/°C	Water mass %	Lithium mass % (compiler)	Chlorate mol % (compiler)	mol kg ⁻¹ (compiler)	Nature of the solid phase
7.85	38.49	61.51	24.16	17.68	$\text{LiClO}_3 \cdot 3\text{H}_2\text{O}$
7.9	36.56	63.44	25.70	19.20	"
7.4	35.12	64.88	26.91	20.44	"
6.8	33.89	66.11	27.99	21.58	"
6.0	32.82	67.18	28.97	22.64	"
4.5	31.61	68.39	30.13	23.94	"
4.0	30.56	69.44	31.17	25.14	"
3.4	30.26	69.74	31.48	25.50	"
0.9	28.82	71.18	32.99	27.32	"
0.0	28.11	71.89	33.76	28.29	"
- 1.6	27.20	72.80	34.79	29.61	"
- 1.8	27.61	72.39	34.32	29.07	"
- 3.6	26.26	73.74	35.88	31.07	"
- 5.8	25.37	74.63	36.96	32.54	"
- 7.3	25.03	74.97	37.38	33.14	"
- 7.8	24.55	75.45	37.99	34.00	"
-13.6	22.75	77.25	40.36	37.57	"
+ 3.8	28.11	71.89	33.76	28.29	$\text{LiClO}_3 \cdot \text{H}_2\text{O}$
5.1	27.61	72.39	34.32	29.01	"
6.8	27.20	72.80	34.79	29.61	"
9.1	26.26	73.74	35.88	31.07	"
11.2	25.37	74.63	36.96	32.54	"
12.0	25.03	74.97	37.38	33.14	"
13.4	24.55	75.45	37.99	34.00	"
14.1	23.41	76.59	39.47	36.19	"
14.6	23.79	76.21	38.97	35.44	"
16.7	22.75	77.25	40.36	37.57	"
18.9	21.46	78.54	42.18	40.49	"
20.5	19.73	80.27	44.78	45.01	"
- 3.2	23.41	76.59	39.47	36.19	$\gamma\text{-LiClO}_3$
+ 2.9	22.41	77.59	40.83	39.30	"
8.4	21.67	78.33	41.87	39.99	"
12.8	20.74	79.26	43.24	42.28	"
16.4	20.32	79.68	43.87	43.38	"
22.1	18.32	81.68	47.05	49.32	"
27.2	17.33	82.67	48.74	52.77	"
27.6	18.33	81.67	47.03	49.29	"
32.0	17.20	82.80	48.96	53.26	"
32.0	16.09	83.91	50.97	57.69	"
32.8	16.42	83.58	50.36	56.31	"
36.2	15.48	84.52	52.11	60.40	"
36.8	14.64	85.36	53.75	64.50	"
39.6	13.73	86.27	55.60	69.51	"
43.9	12.83	87.17	57.52	75.16	"
36.9	13.73	86.27	55.60	69.51	$\beta\text{-LiClO}_3$
48.1	13.67	86.33	55.73	69.87	"
48.3	12.83	87.17	57.52	75.16	"
49.8	12.51	87.49	58.23	77.37	"
61.6	11.81	88.19	59.81	82.61	"
67.2	10.57	89.43	62.77	93.60	"
71.3	9.72	90.28	64.93	102.8	"
72.6	9.98	90.02	64.26	99.79	"
78.9	8.61	91.39	67.90	117.4	"
85.8	7.46	92.54	71.20	137.2	"

COMPONENTS:		ORIGINAL MEASUREMENTS:			
(1) Lithium chlorate; LiClO ₃ ; [13453-71-9]		Kraus, C.A.; Burgess, W.M.			
(2) Water; H ₂ O; [7732-18-5]		J. Am. Chem. Soc. <u>1927</u> , 49, 1226-35.			
EXPERIMENTAL VALUES: (Continued)					
t/°C	Water mass %	Lithium mass % (compiler)	Chlorate mol % (compiler)	mol kg ⁻¹ (compiler)	Nature of the solid phase
86.4	7.85	92.15	70.06	129.9	β-LiClO ₃
86.6	7.40	92.60	71.38	138.4	"
90.0	6.55	93.45	73.98	157.8	"
90.7	7.06	92.94	72.40	145.6	"
92.3	6.32	93.68	74.71	164.0	"
95.7	6.23	93.77	75.00	166.5	"
95.7	5.65	94.35	76.90	184.7	"
100.2	4.91	95.09	79.42	214.3	α-LiClO ₃
102.5	5.40	94.60	77.74	193.8	"
103.4	4.44	95.56	81.09	238.1	"
107.3	4.30	95.70	81.60	246.2	"
107.7	3.68	96.32	83.91	289.6	"
108.0	3.98	96.02	82.78	266.9	"
114.1	3.14	96.86	86.01	341.3	"
115.1	2.67	97.33	87.90	403.3	"
115.3	2.46	97.54	88.77	438.6	"
120.3	1.44	98.56	93.17	757.2	"
121.3	1.53	98.47	92.77	712.0	"
126.7	0.83	99.17	95.97	1322	"
127.0	0	100	100	---	"
127.6	0	100	100	---	"

COMPONENTS:		ORIGINAL MEASUREMENTS:			
(1) Lithium chlorate; LiClO ₃ ; [13453-71-9]		Berg, L.			
(2) Water; H ₂ O; [7732-18-5]		Z. Anorg. Allg. Chem. <u>1929</u> , 181, 131-6.			
VARIABLES:		PREPARED BY:			
T/K = 273.2 to 400.7		Hiroshi Miyamoto			
EXPERIMENTAL VALUES:					
t/°C	Water mass %	Lithium Chlorate		mol kg ⁻¹ (compiler)	Nature of the solid phase
		mass % (compiler)	mol % (compiler)		
127.5 ^a	0.0	100	100	-	α-LiClO ₃
126 ^a	0.5	99.5	97.5	2200	"
124 ^a	1.0	99.0	95.2	1100	"
118.5 ^a	2.4	97.6	89.0	450	"
113.5 ^a	3.0	97.0	86.6	358	"
106.6	4.1	95.9	82.3	259	"
105 ^a	4.5	95.5	80.9	235	"
104	4.6	95.4	80.5	229	"
100	4.9	95.1	79.5	215	"
100	5.0	95.0	79.1	210	"
95	5.5	94.5	77.4	190	β-LiClO ₃
90	7.0	93.0	72.6	147	"
(90)	6.2	93.8	75.1	167	"
89 ^a	7.0	93.0	72.6	147	"
85	7.9	92.1	69.9	129	"
84 ^a	8.1	91.9	69.3	126	"
81 ^a	9.0	91.0	66.8	112	"
80.9	9.0	91.0	66.8	112	"
70.0	10.8	89.2	62.2	91.4	"
68	11.2	88.8	61.2	87.7	"
60.0	11.9	88.1	59.6	81.9	"
55 ^a	12.6	87.4	58.0	76.7	"
55.0	12.9	87.1	57.4	74.7	"
50.0	13.9	86.1	55.2	68.5	"
45.0	14.3	85.7	54.4	66.3	"
continued					
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:		
<p>Two different methods were used to determine the solubility of lithium chlorate in water. (1) Synthetic method used with visual observation of temperature of crystallization. The weighed salt and water were placed into a test-tube equipped with a stirrer and a thermocouple. The test-tube was placed in a larger test-tube which was then placed in a paraffin oil bath. The bath was slowly and evenly warmed. When the salt in the tube disappeared, the temperature of the sample solution was measured by the thermocouple. Next the bath was gently cooled, and when the salt appeared the temperature was measured again. (2) The isothermal method was used to obtain an accurate liquidus curve. The salt and water were placed into an apparatus with stirrer fitted with a mercury seal. The apparatus was placed in an oil thermostat. The lithium content was determined gravimetrically (in duplicate) as lithium sulfate.</p>			No information was given.		
			<p>ESTIMATED ERROR: Soly: precision within 0.2 %. Temp: precision ± 0.1 K (author).</p>		

COMPONENTS: (1) Lithium chlorate; LiClO_3 ; [13453-71-9] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Berg, L. Z. Anorg. Allg. Chem. 1929, 181, 131-6.
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CRITICAL EVALUATION: (Continued)

t/°C	Water mass %	Lithium Chlorate		mol kg ⁻¹ (compiler)	Nature of the solid phase
		mass % (compiler)	mol % (compiler)		
42 ^a	15.1	84.9	52.8	62.2	$\text{LiClO}_3 \cdot 1/3\text{H}_2\text{O}$
40.0	15.3	84.7	52.5	61.2	"
35.0	15.8	84.2	51.5	59.0	"
30.0	16.3	83.7	50.6	56.8	"
25.0	17.1	82.9	49.1	53.6	"
20.0	17.5	82.5	48.4	52.2	"
30.0	17.7	82.3	48.1	51.4	"
25.0	18.9	81.1	46.1	47.5	"
20.0	19.6	80.4	45.0	45.4	$\text{LiClO}_3 \cdot \text{H}_2\text{O}$
20.0	20.5	79.5	43.6	42.9	"
18.0	22.3	77.7	41.0	38.5	"
16.2	23.2	76.8	39.8	36.6	"
12.7	24.8	75.2	37.7	33.5	"
9.2	25.9	74.1	36.3	31.7	"
8.0	26.3	73.7	35.8	31.0	"
7.4	34.4	65.6	27.5	21.1	"
6.0	42.6	57.4	21.2	14.9	"
3.0	45.9	54.1	19.0	13.0	"
0.0	29.0	71.0	32.8	27.1	$\text{LiClO}_3 \cdot 3\text{H}_2\text{O}(?)$
0.0	46.9	53.1	18.4	12.5	$\text{LiClO}_3 \cdot \text{H}_2\text{O}(?)$

^aThese data obtained by synthetic method experiments. All other data from isothermal solubility determinations.

COMPONENTS: (1) Lithium chlorate; LiClO_3 ; [13453-71-9] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Treadwell, W.D.; Ammann, A. <i>Helv. Chim. Acta.</i> <u>1938</u> , 21, 1249-65.
VARIABLES: One temperature: 293 K	PREPARED BY: Hiroshi Miyamoto
EXPERIMENTAL VALUES: <p>The solubility of lithium chlorate in water at 20°C is given as:</p> $18.32 \text{ mol kg}^{-1}$ <p>The concentration solubility product was also given simply as the square of the solubility:</p> $3.36 \times 10^2 \text{ mol}^2 \text{ kg}^{-2}$	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: No information was given.	SOURCE AND PURITY OF MATERIALS: No information was given. <hr/> ESTIMATED ERROR: Nothing specified. <hr/> REFERENCES:

COMPONENTS:			ORIGINAL MEASUREMENTS:	
(1) Lithium chlorate; LiClO_3 ; [13453-71-9]			Campbell, A.N.; Griffiths, J.E.	
(2) Water; H_2O ; [7732-18-5]			Can. J. Chem. <u>1956</u> , 34, 1647-61.	
VARIABLES:			PREPARED BY:	
T/K = 229.9 to 400.7			Hiroshi Miyamoto	
EXPERIMENTAL VALUES:				
	solubility			
t/°C	mass %	mol kg^{-1} (compiler)	Method	Nature of the solid phase ^a
0.0	-	-	Thermal analysis	A
- 6.5	10.4	1.28	"	"
-14.2	20.0	2.77	"	"
-26.2	29.2	4.56	"	"
-28.6	30.2	4.79	"	"
-40.4	36.0	6.22	"	"
-43.3	37.3	6.58	"	A+B
-16.9	45.8	9.35	Solubility	B
- 1.5	52.8	12.4	"	"
+ 3.0	56.7	14.5	"	"
5.2	57.9	15.2	"	"
6.0	58.7	15.7	"	"
8.1	60.8	17.2	"	"
6.0	68.1	23.6	"	"
3.0	70.8	26.8	"	"
- 0.1	73.1	30.1	Thermal analysis	B+C
3.0	73.6	30.8	Solubility	C
5.6	74.2	31.8	"	"
6.0	74.1	31.7	"	"
8.5	75.1	33.4	"	"
10.5	75.7	34.5	"	"
continued.....				
AUXILIARY INFORMATION				
<p>For solutions in equilibrium with ice, the solubilities were determined by the thermal method. The compositions of saturated solutions were determined by chemical analysis. The method of thermal analysis was also used for binary eutectics and $\alpha \rightarrow \beta$ transition, and all other solubilities were determined "in the usual way" (i.e. the isothermal method, compiler). Temperatures for thermal analyses were measured with an iron-constantan thermocouple and a potentiometer. The composition of the solid solutions was determined by chlorate analysis. Aliquots were transferred to a 250 ml iodine flask and 40 ml concentrated orthophosphoric acid added, followed by the addition of about 0.1 g sodium carbonate to exclude air from the flask. Approximately 25 ml of iodate-free potassium iodide solution (0.2 gm/ml) was added, and the stoppered flask allowed to stand at room temperature for 60 to 70 min. The free iodine was titrated with sodium thiosulphate. Standardization of the method with pure sodium chlorate indicated an accuracy of ± 0.4 %.</p>				

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Lithium chlorate; LiClO_3 ; [13453-71-9]	Campbell, A.N.; Griffiths, J.E.
(2) Water; H_2O ; [7732-18-5]	Can. J. Chem. <u>1956</u> , 34, 1647-61.

EXPERIMENTAL VALUES: (Continued)

t/°C	Solubility		Method	Nature of the solid phase ^a
	mass %	mol kg ⁻¹ (compiler)		
14.0	77.5	38.1	Solubility	C
15.0	78.0	39.2	"	"
16.0	78.5	40.4	"	"
18.0	79.3	42.4	"	"
20.5	81.9	50.1	"	C+D
21.5	82.0	50.4	Solubility	D
25.0	82.6	52.5	"	"
30.2	83.4	55.6	"	"
32.6	83.6	56.4	"	"
38.5	85.2	63.7	"	"
-10.5	78.7	40.9	Thermal Analysis	B+D
-25.0	82.7	52.9	"	B+E
44.2	86.7	72.1	Solubility	E
47.9	87.2	75.4	"	"
54.0	87.8	79.6	"	"
63.2	89.5	94.3	"	"
72.8	91.0	112	"	"
81.7	92.4	135	"	"
86.2	93.7	165	"	"
90.7	93.8	167	"	"
94.2	94.8	202	"	"
97.5	95.5	235	"	"
98.9	95.9	259	"	"
127.5	100.0	∞	Thermal Analysis	F

^a A = Ice; B = $\text{LiClO}_3 \cdot 3\text{H}_2\text{O}$; C = $\text{LiClO}_3 \cdot \text{H}_2\text{O}$; D = $(\text{LiClO}_3)_4 \cdot \text{H}_2\text{O}$; E = $\beta\text{-LiClO}_3$;
F = $\alpha\text{-LiClO}_3$.

AUXILIARY INFORMATION

SOURCE AND PURITY OF MATERIALS:

A 1 mol dm⁻³ barium chlorate solution was heated to about 85°C, and a 1 mol dm⁻³ lithium sulfate solution was added slowly from a dropping funnel until equivalence was reached. The precipitated barium sulfate was removed by repeated filtration. The solution was evaporated slowly up to an approximated concentration of 50 % lithium chlorate. The filtered solution was transferred to a 250 ml Claissen flask and dehydration was carried out under a reduced pressure of less than 5 mm Hg, the distillate being absorbed in concentrated sulfuric acid. In this process, the temperature was kept below 85°C. Upon cooling, the solution to room temperature, the salt crystallized; it was placed under vacuum over phosphorus pentoxide. To remove the last trace of water, the salt was placed in a vacuum oven over phosphorus pentoxide, and maintained at 80°C.

ESTIMATED ERROR:

Isothermal method:

Soly: accuracy of ± 0.4 % (authors)

Temp: precision ± 0.05 K (authors).

Thermal analysis: nothing specified.