CCCCXXXIV.—*The Solubility of Lithium Chloride in Water.*

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KREMERS (*Pogg. Ann.*, 1856, **99**, 25) gave six results for the solubility of lithium chloride from 0° to 160°. His temperature intervals were necessarily too large to enable the changes at the transition points $LiCl,2H_2O \rightleftharpoons LiCl,H_2O$ and $LiCl,H_2O \rightleftharpoons LiCl$ to be observed. Since then no systematic study of the solubility appears to have been published, although data at several isolated temperatures, mostly near 25°, have been recorded at various times.

Temp.	Ref.	S.	Solid phase.	Temp.	Ref.	S.	Solid phase.
0°		40·85	$LiCl,2H_2O$	25·0°	R	44·9	$LiCl,H_2O$
0	E	40·5	,,	25·0	S	45·8	,,
0	K	38·9	,,	25·0	D	45·37	,,
8·0		42·38	,,	29·0		46·32	,,
10·2		42·75	,,	30·0	SK	46·1	,,
13·0		43·32	,,	34·5		46·67	,,
13·8		43·50	,,	41·0		47·47	,,
14·2		43·86	,,	47·0		48·23	,,
(16·0)		(47·91)	,,	50·0	DX	49·6	,,
16·2		44·60	,,	61·6		50·05	,,
16·4		44·23	,,	65	K	51·0	,,
18·0		45·31	$LiCl,H_2O$	72·0		51·71	,,
19·0		45·22	,,	81·6		53·37	,,
20	K	44·6	,,	86·6		54·60	,,
21·2		45·47	,,	88·0		54·54	,,
24·6		45·89	,,	95·0	K	56·5	,,
25·0	CC	45·4	,,				

K.   Kremers, *loc. cit.*
E.   Calc. from Engel, *Ann. Chim. Phys.*, 1888, **13**, 370.
S.   Smits, Elgersma, and Hardenberg, *Rec. trav. chim.*, 1924, **43**, 671.
D.   Deacon, J., 1927, 2063.
SK. Schreinemakers and Kayser, *Chem. Weekblad*, 1918, **15**, 120.
DX. Demassieux, *Ann. Chim.*, 1923, **20**, 233.
R.   Pina de Rubies, *Anal. Fis. Quim.*, 1913, **11**, 422; 1914, **12**, 343.
CC. Collins and Cameron, *J. Physical Chem.*, 1928, **32**, 1712.

In the present research the lithium chloride was prepared by dissolving the pure carbonate in dilute acid and twice recrystallising the product. Saturated solutions at various temperatures were prepared in an apparatus similar to that already described (Friend, J., 1930, 1633). A weighed quantity of the filtered solution was diluted to 250 c.c., and an aliquot portion measured by a pipette into a platinum dish. This was evaporated to a syrup on the water-bath, dried in an electric oven at 150—180°, and momentarily heated above wire gauze over a gas flame to incipient fusion. This

ensured complete removal of the last traces of water (see Moser and Schutt, *Monatsh.*, 1929, **51**, 23; Winkler, *Z. anal. Chem.*, 1913, **52**, 628) and was found to yield accurate results, as the following data show. Known weights of pure lithium carbonate were converted into chloride and estimated as above.

LiCl, g. (found) .... 1·9838   2·1270   2·0314
   ,,   (calc.) .... 1·9833   2·1232   2·0311

In the table S represents the solubility as g. of anhydrous lithium chloride per 100 g. of solution; the results of other workers are embodied, together with the appropriate references.

Temperature.
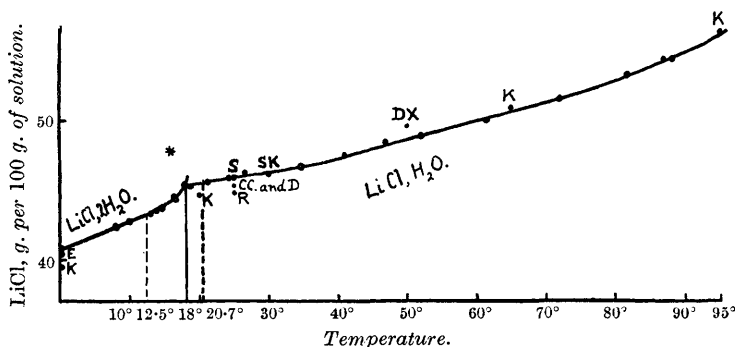
The foregoing results are shown in the figure. The transition point LiCl,2H_2O $\rightleftharpoons$ LiCl,H_2O appears to occur at approximately 18°. Bogorodsky (*J. Russ. Phys. Chem. Soc.*, 1911, **43**, 1268) obtained the value 20·7° although in 1893 he had found 12·5°, indicating considerable stability of the metastable phases in these regions. In the neighbourhood of these points the solutions were frequently viscous and difficult to filter. The solution in the experiment at 16°, shown in the figure as *, was very viscous.

As usual with early solubility determinations, the results of Kremers at the lower temperatures are too low. The figure given by Piña de Rubies at 25° is slightly too low; he estimated his lithium chloride by titration with silver nitrate.

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