200. *The Solubility of Lithium Chloride in Water between* 70° *and* 160°.

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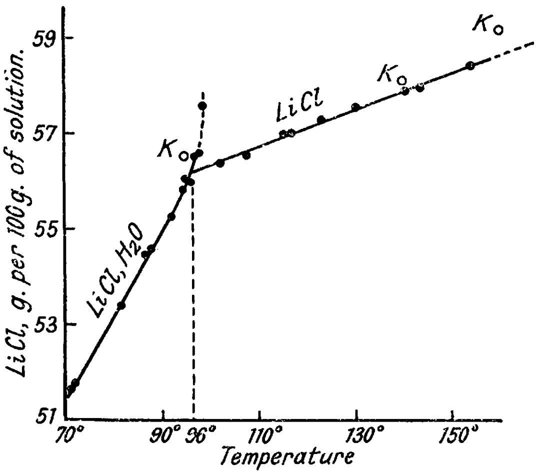
The solubilities of the two hydrates of lithium chloride in water have already been determined by usual methods (Friend and Colley, J., 1931, 3148) between 0° and 88°. Above 96° the stable solid phase consists of the anhydrous salt, but attempts to determine its solubility, by using an oil-bath and an apparatus similar to that of Walton and Judd (*J. Amer. Chem. Soc.*, 1911, **33**, 1036), yielded irregular results. This was apparently due to the great stability of $LiCl,H_2O$ in the metastable state above the transition temperature. It was decided, therefore, to adopt the synthetic method.

Mixtures of anhydrous salt and water were heated in sealed tubes in an oil-bath with repeated shaking until the solid phase disappeared, the mean temperature after repeated trials being evaluated. The anhydrous salt crystallised on cooling as flakes, like boric acid, which floated in the viscous solution, and their glistening appearance enabled the moment of their disappearance on re-warming to be noted with relative ease. Experiments at temperatures below 96° showed that this synthetic method gave results identical within the error of experiment with the ordinary method.



K = *Kremers*, loc. cit.

The concentration of lithium chloride was determined either, as before, by evaporation of an aliquot portion in a platinum dish, followed by momentary heating to incipient fusion to render the salt anhydrous, or by titration with silver nitrate solution. The two methods gave closely concordant results.

Kremers (*Pogg. Ann.*, 1856, **99**, 25) gave the solubilities of lithium chloride at 65°, 95°, 140°, and 160°. Since then no systematic study of the subject appears to have been published. His temperature intervals are too large to enable even an approximate value for the transition temperature of $LiCl,H_2O \rightleftharpoons LiCl$ to be estimated. Bogorodsky (*J. Russ. Phys. Chem. Soc.*, 1893, **25**, 316) gave 98° for this point.

In the following table *S* represents the solubility as g. of anhydrous lithium chloride per 100 g. of solution.

Temp.	*S.*	Solid phase.*	Ref.	Temp.	*S.*	Solid phase.*	Ref.	Temp.	*S.*	Solid phase.*	Ref.
71·5°	51·61	A		95·3°	56·01	A		117·0°	57·00	C	
72·0	51·71	,,	F. & C.	95·5	55·99	,,		123·0	57·28	,,	
81·6	53·37	,,	,,	96·2	56·57	B		130·5	57·58	,,	
87·0	54·46	,,		97·1	56·60	,,		140	58·1	,,	K.
88·0	54·54	,,	F. & C.	98·2	57·55	,,		140·5	57·90	,,	
92·0	55·27	,,		101·8	56·40	C		143·6	57·98	,,	
94·6	55·84	,,		107·6	56·52	,,		154·0	58·46	,,	
95·0	56·5	,,	K.	115·4	56·95	,,		160	59·2	,,	K.

* A = $LiCl,H_2O$; B = Metastable $LiCl,H_2O$; C = LiCl.

References.—F. & C. = Friend and Colley (*loc. cit.*); K = Kremers (*loc. cit.*).

The foregoing results are shown in the figure. The transition temperature $LiCl,H_2O \rightleftharpoons LiCl$ is approximately 96°. The solubility of the anhydrous salt is a linear function of the temperature like that of sodium chloride, but unlike that of potassium chloride. Kremers' results are, in general, too high.

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