TABLE 8. DENSITY OF LITHIUM CHLORIDE SOLUTIONS

Concentration Pound Mols (42.4 lb) *LiCl* per 1000 lb Water	Temperature Deg F						
	0	50	100	150	200	250	300
0							
2		1.045	1.037	1.026	1.012		
4	1.090	1.085	1.076	1.064	1.052		
6	1.124	1.119	1.111	1.100	1.087		
8	1.156	1.150	1.143	1.132	1.122		
10	1.188	1.181	1.172	1.162	1.152	1.142	
12	1.217	1.209	1.199	1.188	1.178	1.168	
14	1.242	1.235	1.225	1.214	1.203	1.192	
16		1.257	1.248	1.236	1.226	1.215	
18		1.279	1.270	1.259	1.248	1.237	
20			1.291	1.280	1.279	1.568	
22				1.310	1.289	1.278	1.267
24				1.317	1.307	1.296	1.286
26					1.313	1.312	1.302
28					1.338	1.327	1.318
30						1.34	1.33
32							1.35

a finely divided spray of the brine but more generally by passing the air over a metal surface coil where the liquid absorbent presents a large surface to the air stream. The difference in vapor pressure causes some of the vapor in the air-vapor mixture to migrate into the brine. Here it condenses into liquid water and decreases the concentration of the absorbent. In order that the process be continuous means must be provided for counteracting the diluting effect of the extracted moisture and also for maintaining the temperature of the brine sufficiently low to hold the desired vapor pressure.

As the water vapor is added to the absorbent and condenses, it gives up its latent heat of condensation which tends to raise the temperature of

TABLE 9. VISCOSITY OF LITHIUM CHLORIDE SOLUTIONS (MILLIPOISE)

Temp. Deg F	Concentration in Pound Mols (42.4 lb) per 1000 lb Water												
	0	2	4	6	8	10	12	14	16	18	20	22	24
0			56.75	72.44	97.05	136.8	199.5						
20		28.91	37.07	47.42	63.09	84.94	123.3	178.6					
40	15.45	19.91	25.53	32.58	43.05	58.48	81.10	116.1	165.6				
60	11.02	14.26	18.37	23.55	30.90	41.40	56.62	79.80	111.2	156.3			
80	8.61	11.19	14.42	18.62	24.32	32.28	43.45	60.26	82.04	113.8			
100	6.82	8.89	11.48	14.94	19.36	25.59	33.96	46.13	61.52	84.72	118.3		
120	5.60	7.31	9.51	12.30	15.92	20.99	27.67	36.64	48.31	65.77	89.95		
140	4.70	6.15	8.07	10.42	13.43	17.66	22.96	30.06	38.99	52.48	71.12	95.94	
160	4.01	5.25	6.92	8.93	11.51	15.00	19.36	25.06	32.14	42.76	56.89	75.86	106.2
180	3.48	4.56	6.01	7.78	10.00	12.91	16.56	21.28	27.10	35.48	46.45	60.67	84.33
200	3.05	4.01	5.28	6.86	8.79	11.22	14.32	18.28	23.12	29.92	38.55	50.70	67.92
220	2.72	3.58	4.72	6.14	7.83	9.93	12.59	16.00	20.14	25.64	32.96	43.05	56.49
240	2.43	3.21	4.25	5.50	7.02	8.83	11.12	14.09	17.62	22.18	28.31	36.98	47.42
260	2.19	2.90	3.84	4.94	6.46	7.91	9.91	12.47	15.50	19.36	24.60	31.92	40.55
280	2.00	2.66	3.52	4.51	5.75	7.19	8.97	11.27	14.00	17.22	21.78	28.05	35.56
300	1.86	2.48	3.28	4.17	5.32	6.67	8.28	10.38	12.82	15.70	19.68	25.12	31.92
320	1.74	2.32	3.08	3.89	4.94	6.19	7.73	9.64	11.86	14.45	18.03	22.80	29.11

both the absorbent and the moist air stream. For every pound of water absorbed and condensed the heat added to the air stream and the brine combined is obtainable from steam tables. For instance, at 60 F the amount of this heat is about 1057 Btu. In addition to this heat there is involved also the so-called heat of mixing which is frequently considerable.

Temperature-Pressure-Concentration Relations

Since the absorption process can continue only as long as there is a difference in vapor pressure between the absorbent and the air-vapor mixture and since at a given temperature of the absorbent the vapor pressure depends on the concentration of the solution, evidently there must be a relation between these quantities which if known would state the limits of the process. The relationship would also depend on the absorbent being used, and would have to be determined for each substance

TABLE 10. PROPERTIES OF LITHIUM CHLORIDE SOLUTIONS

Concentration Pound Mols (42.4 lb) *LiCl* per 1000 lb Water	Partial Heat of Mixing at 0 F BTU per lb	Temperature Coef. of Partial Heat of Mixing BTU per lb per F	Specific Heat at 70 F	Boiling Point F (at 760 MM Hg.)	Freezing Point	Substance that First Separates Out on Freezing
0	0.0	0.0	0.998	212.0	32	Ice
2	2.04	−0.014	0.901	215.8	16.3	Ice
4	7.24	−0.036	0.831	221.5	−5.8	Ice
6	16.7	−0.069	0.778	228.9	−34.2	Ice
8	31.9	−0.109	0.739	238.1	−69	Ice
10	51.1	−0.143	0.710	248.4	−90	Ice
12	75.7	−0.160	0.687	258.8	−40	$LiCl\text{-}3H_2O$
14	90.8	−0.167	0.666	268.9	1	$LiCl\text{-}3H_2O$
16	124.8	−0.176	0.647	277.9	36.5	$LiCl\text{-}2H_2O$
18	145	−0.186	0.631	285.8	58.1	$LiCl\text{-}2H_2O$
20	162	−0.194	0.617	293.2	86.4	$LiCl\text{-}H_2O$
22	171	−0.20	0.604	300.2	133	$LiCl\text{-}H_2O$
24	177	−0.20	0.59	307	156	$LiCl\text{-}H_2O$
26	182	−0.21	0.58	313	180	$LiCl\text{-}H_2O$
28	191	−0.21	0.575	318	190	$LiCl\text{-}H_2O$
30	194	−0.21	0.57	323	195	$LiCl\text{-}H_2O$
32	198	−0.22	0.56	328	280	*LiCl*

used as an absorbent. Fig. 2 shows this relationship graphically for lithium chloride. It will be noted that this chart is essentially similar to that shown in Fig. 1 and its direct usefulness is limited by much the same considerations.

In order to permit numerical calculations of air conditioning problems it is desirable to have tables for use instead of a chart like Fig. 2, and Tables 7, 8, 9 and 10 can be used in making calculations for lithium chloride.

Instead of tabulating the vapor pressure of the solution of lithium chloride it is preferable to tabulate the dew-point of air in equilibrium with lithium chloride, since it is easy to interpolate between values of the dew-point and not so easy to interpolate accurately between values of vapor pressure. The values for dew-point may be converted to vapor pressures, relative humidity, and wet-bulb of air in equilibrium by means of the usual psychrometric chart or formula.