

TABLE 1. PROPERTIES OF LITHIUM CHLORIDE SOLUTIONS

CONCENTRATION POUND MOLS (42.4 LB) LiCl PER 1000 LB WATER	CONCENTRATION PER CENT BY WEIGHT	SPECIFIC GRAVITY AT 100 F	VISCOSITY (MILLIPOISE)		PARTIAL HEAT OF MIXING AT 0 F. BTU PER LB	TEMP. COEFF. OF PARTIAL HEAT OF MIXING BTU PER LB PER F	SPECIFIC HEAT AT 70 F	BOILING POINT F AT (760 MM Hg)	FREEZING POINT, F
			80 F	180 F					
0	0.0	1.000	8.61	3.48	0.00	0.000	0.998	212.0	32.0
2	7.8	1.037	11.19	4.56	2.04	-0.014	0.901	215.8	16.3
4	14.5	1.076	14.42	6.01	7.24	-0.036	0.831	221.5	-5.8
6	20.2	1.111	18.62	7.78	16.70	-0.069	0.778	228.9	-34.2
8	25.3	1.143	24.32	10.00	31.90	-0.109	0.739	238.1	-69.0
10	29.7	1.172	32.28	12.91	51.10	-0.143	0.710	248.4	-90.0
12	33.7	1.199	43.45	16.56	75.70	-0.160	0.687	258.8	-40.0
14	37.4	1.225	60.26	21.28	90.80	-0.167	0.666	268.9	1.0
16	40.4	1.248	82.04	27.10	124.80	-0.176	0.647	277.9	36.5
18	43.3	1.270	113.80	35.48	145.00	-0.186	0.631	285.8	58.1
20	46.0	1.291		46.45	162.00	-0.194		293.2	86.4
22	48.4			60.67	171.00	-0.200		300.2	133.0
24	50.3			84.33	177.00	-0.200		307.0	156.0
26	52.4				182.00	-0.210		313.0	180.0
28	54.3				191.00	-0.210		318.0	190.0
30	56.1				194.00	-0.210		323.0	195.0
32	57.5				198.00	-0.220		328.0	280.0

TABLE 2. DEW-POINT OF AIR IN EQUILIBRIUM WITH LITHIUM CHLORIDE SOLUTIONS
CONCENTRATION IN POUND MOLS (42.4 LB) LITHIUM CHLORIDE PER 1000 LB WATER

DEW-POINT AT ZERO CONC.	CONCENTRATION OF LITHIUM CHLORIDE														
	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0
320	315.2	308.7	299.9	290.2	279.7	269.4	259.6	251.5	244.1	236.5	230.0	223.8	218.6	214.5	210.3
300	295.4	289.1	280.5	270.9	260.6	250.5	240.8	232.6	225.4	218.0	211.8	205.8	200.8	196.9	192.8
280	275.6	269.5	261.1	251.7	241.5	231.6	222.2	214.0	206.7	199.7	193.5	187.8	183.2	179.3	175.2
260	255.8	250.0	241.9	232.6	222.7	212.8	203.5	195.5	188.4	181.7	175.4	170.0	165.6	162.0	158.4
240	236.0	230.4	222.5	213.5	203.8	194.2	185.0	177.1	170.0	163.6	157.5	152.2	148.3	144.6	140.5
220	216.2	210.8	203.2	194.4	184.9	175.5	166.4	158.6	151.6	145.3	139.6	134.6	130.7	127.3	124.2
200	196.4	191.2	183.9	175.4	166.1	156.7	148.0	140.3	133.5	127.3	121.9	117.0	113.3	110.1	
180	176.6	171.6	164.7	156.4	147.3	138.1	129.6	122.1	115.5	109.4	104.2	99.6	96.0		
160	156.8	152.1	145.4	137.4	128.6	119.7	111.3	103.9	97.4	91.6	86.6	82.2			
140	137.0	132.6	126.1	118.4	109.9	101.3	93.1	85.9	79.5	73.8	69.0				
120	117.2	113.0	106.8	99.4	91.1	82.7	74.7	67.8	61.5	56.0					
100	97.4	93.4	87.5	80.5	72.7	64.4	56.6	49.8	43.7	38.2					
90	87.5	83.6	77.9	71.0	63.3	55.2	47.6	40.8	34.8	29.3					
80	77.6	73.8	68.4	61.6	54.0	46.1	38.5	31.8	25.9	20.6					
70	67.7	64.0	58.7	52.2	44.8	37.0	29.5	22.9	17.2	12.0					
60	57.8	54.3	49.1	42.7	35.5	27.9	20.5	14.0	8.3						
40	38.0	34.7	29.9	23.9	16.9	9.6	2.4	-3.9							
20		15.1	10.7	5.0	-1.7	-8.7	-15.4								
0		-4.5	-8.6	-13.9	-20.2	-27.0	-33.3								

Example 1. Determine the dew-point, wet-bulb, relative humidity and absolute humidity of air in equilibrium at 100 F with pure lithium chloride solution of density 1.270.

Solution. From Table 1 the concentration of a solution of density 1.270 at 100 F is 18.0 M. From Fig. 2 the dew-point of 18 M lithium chloride at 100 F is 43.7 F. From Table 6, Chapter 1, the partial pressure of water over the solution is 0.2858 in. of Hg, and the absolute humidity is 42.00 grains per pound dry air. From the psychrometric chart, the wet-bulb is 66.3 F, and the relative humidity is 15 per cent.

Example 2. Determine the boiling point, and freezing point of 18 M lithium chloride solutions.

Solution. From Table 1, boiling point (standard) is 285.8 F, freezing point is 58.1 F.

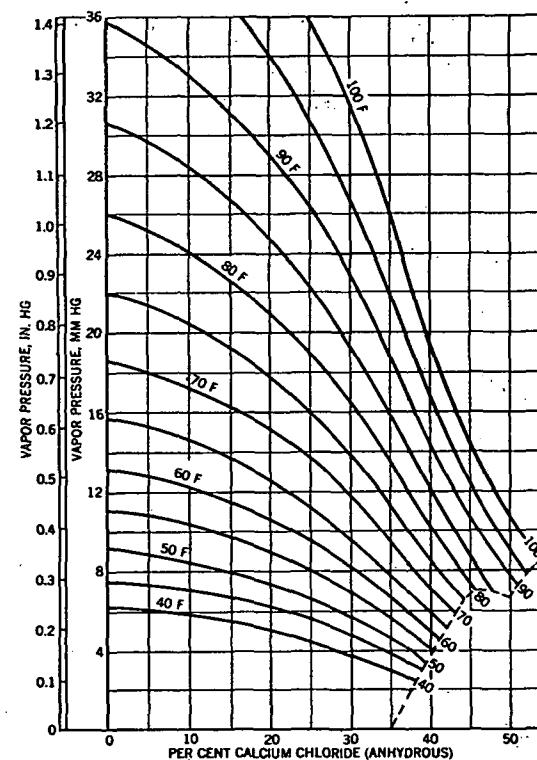


FIG. 3. TEMPERATURE—PRESSURE—CONCENTRATIONS FOR CALCIUM CHLORIDE

Example 3. Calculate the heat of vaporization of 1 lb of water from a large amount of 18 M lithium chloride solution at the boiling point.

Solution. The heat of boiling is equal to the heat of mixing plus the heat of boiling pure water at the same temperature. The heat of mixing from Table 1 at 18 M and 285.8 F is 145 - (0.186 × 285.8) = 92 Btu per pound. The heat of vaporization of water from steam tables at 285.8 F is 920 Btu per pound. Therefore the heat of vaporization of water from the solution is 920 + 92 = 1012 Btu per pound.

Example 4. One thousand pounds of air per minute at 100 F dry-bulb with a dew-point of 70 F and a relative humidity of 39 per cent is passed over 18 M lithium chloride solution. The rate of flow of the solution is 200 gpm and the entering temperature is 80 F. The air leaves the absorber at 85 F dry-bulb and dew-point of 35 F. Calculate