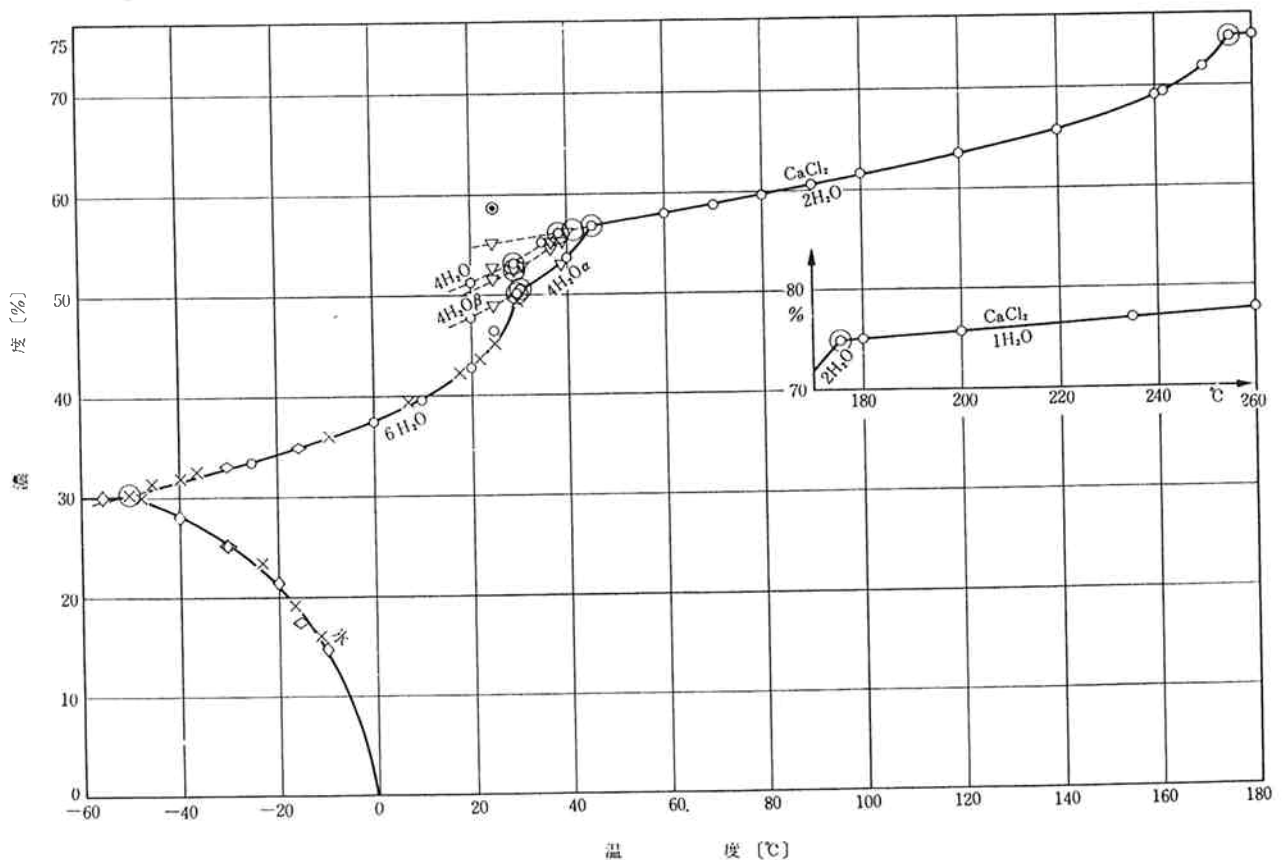


付

塩化カルシウム (Calcium Chloride) の物性

1. 塩化カルシウムの一般的性質^{1),2)}

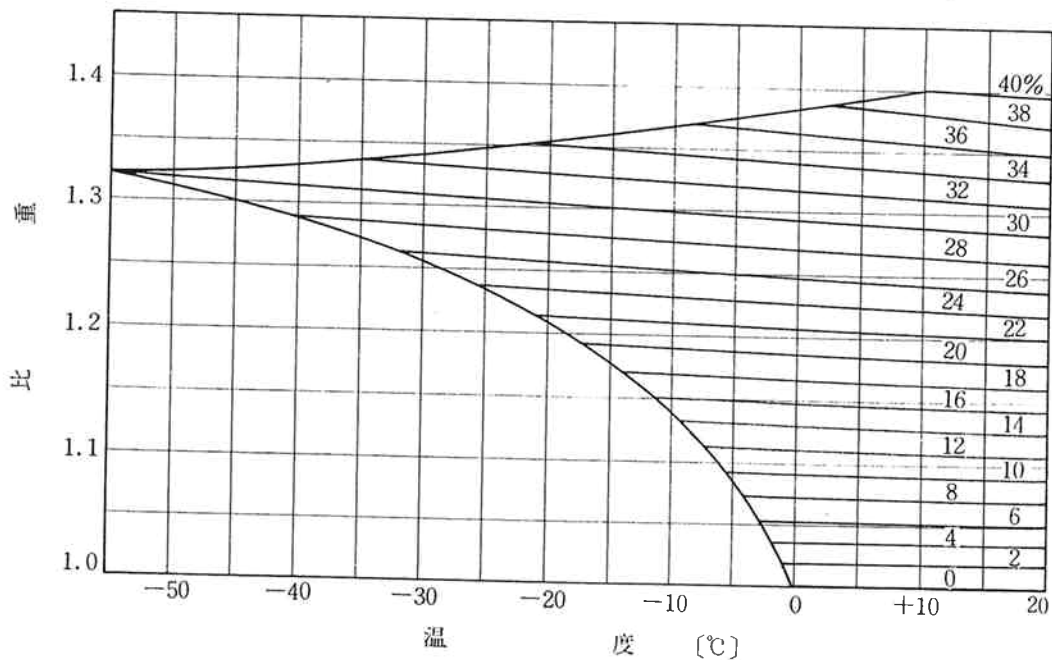
化 学 式	CaCl ₂	CaCl ₂ ·2H ₂ O
分 子 量	110.99	147.02
色、結 晶 系	無, 斜方	無,
比 重	2,152(25/4°C)	—
融 点	772°C	172°C
比 熱	0.164 cal/g·°C (61°C)	—
融 解 熱	61.09 cal/g (782°C)	—
生 成 熱	-1.71 kcal/g	-2.26 kcal/g
潮 解 性	有	有
溶 解 度	水..... 0°C 59.5 g/100 g 100°C 159 "	水..... 0°C 97.7 g/100 g 60°C 326 "
	メタノール...20°C 29.2 "	エタノール...15°C 10 "
	エタノール...20°C 24.5 "	80°C 50 "
溶 解 熱	-178.4 cal/g (25°C) (標準)	-68.0 cal/g(18°C) (400 mol の水で溶解)

2. CaCl₂-H₂O 平衡図³⁾

3. 塩化カルシウム水溶液の比重^{2),4)}

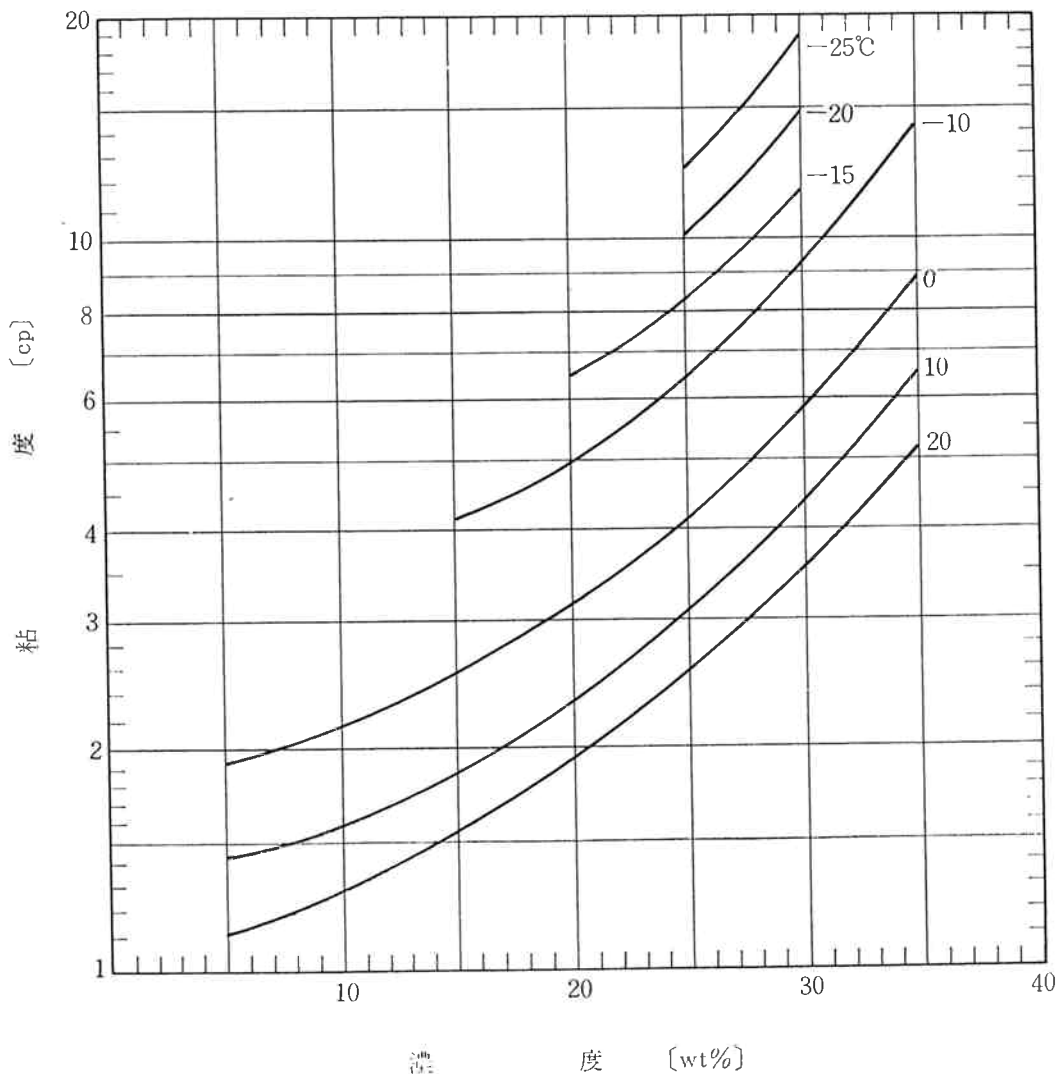
%	-5°C	0°C	+10°C	20°C	25°C	30°C	40°C	50°C	60°C
2		1.0171	1.0166	1.0148	1.0135	1.0120	1.0084	1.0043	0.9994
4		1.0346	1.0337	1.0316	1.0302	1.0286	1.0249	1.0207	1.0158
6		1.0523	1.0509	1.0486	1.0471	1.0455	1.0416	1.0373	1.0324
8	1.0708	1.0703	1.0684	1.0659	1.0643	1.0626	1.0586	1.0542	1.0492
10	1.0894	1.0886	1.0863	1.0835	1.0818	1.0800	1.0760	1.0715	1.0664
12	1.1083	1.1072	1.1045	1.1015	1.0997	1.0978	1.0937	1.0891	1.0840
14	1.1275	1.1261	1.1231	1.1198	1.1180	1.1160	1.1117	1.1070	1.1019
16	1.1471	1.1454	1.1421	1.1386	1.1366	1.1345	1.1301	1.1254	1.1202
18	1.1670	1.1651	1.1616	1.1578	1.1557	1.1535	1.1490	1.1442	1.1389
20	1.1874	1.1853	1.1815	1.1775	1.1753	1.1730	1.1684	1.1635	1.1581
25		1.2376	1.2330	1.2284	1.2260	1.2236	1.2186	1.2134	1.2079
30		1.2922	1.2869	1.2816	1.2790	1.2764	1.2709	1.2654	1.2597
35				1.3373	1.3345	1.3316	1.3255	1.3196	1.3137
40				1.3957	1.3927	1.3895	1.3826	1.3762	1.3700

%	70°C	80°C	90°C	100°C†	110°C	120°C	130°C	140°C
2	0.9940	0.9881	0.9816	0.9748	0.9674	0.9596	0.9514	0.9428
4	1.0104	1.0046	0.9981	0.9915	0.9842	0.9765	0.9685	0.9601
6	1.0270	1.0213	1.0148	1.0085	1.0012	0.9937	0.9859	0.9776
8	1.0439	1.0382	1.0317	1.0257	1.0185	1.0111	1.0035	0.9954
10	1.0611	1.0554	1.0490	1.0432	1.0361	1.0287	1.0213	1.0134
12	1.0787	1.0730	1.0667	1.0610	1.0539	1.0466	1.0394	1.0317
14	1.0966	1.0909	1.0847	1.0790	1.0720	1.0649	1.0577	1.0503
16	1.1148	1.1092	1.1031	1.0973	1.0905	1.0835	1.0763	1.0691
18	1.1335	1.1279	1.1219	1.1160	1.1094	1.1025	1.0954	1.0883
20	1.1528	1.1471	1.1412	1.1352	1.1287	1.1219	1.1150	1.1080
25	1.2024	1.1965	1.1906	1.1846				
30	1.2539	1.2478	1.2419	1.2359				
35	1.3075	1.3013	1.2953	1.2893				
40	1.3635	1.3571	1.3510	1.3450				



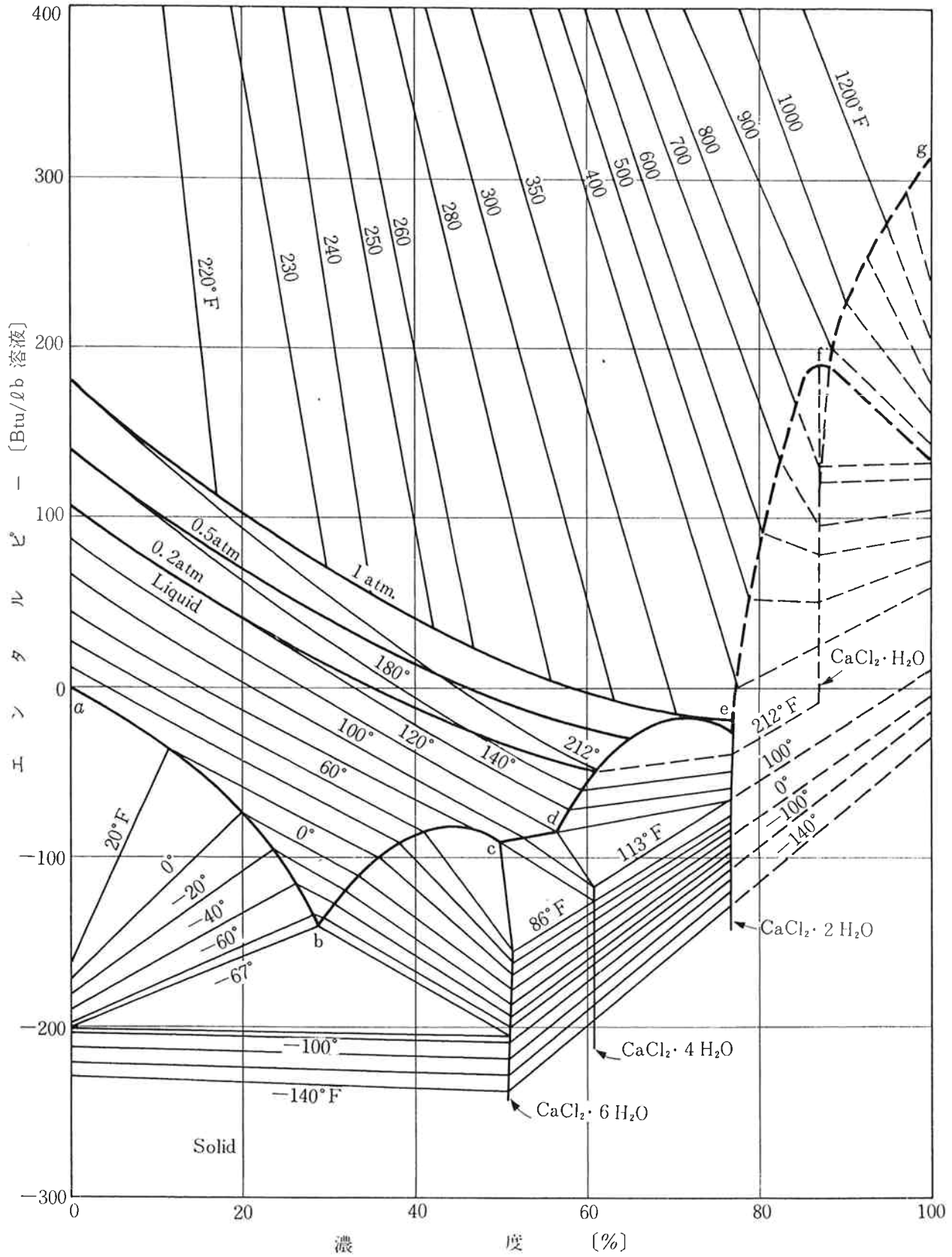
4. 塩化カルシウム水溶液の粘度^{5),6)}

%	μ [cp × 10 ³]				%	μ [cp × 10 ³]				%	μ [cp × 10 ³]		
	20°	10°	0°	-10°		20°	10°	0°	-10°		-15°	-20°	-25°
0.8	1025	1335	1825	—	18.8	1840	2255	3055	4780	18.8	6240	—	—
1.6	1035	1345	1840	—	19.8	1925	2355	3180	4990	19.8	6420	—	—
2.5	1055	1365	1860	—	20.8	2020	2475	3325	5210	20.8	6690	—	—
3.4	1075	1385	1890	—	21.8	2130	2610	3480	5440	21.8	6950	8690	—
4.2	1100	1405	1925	—	22.7	2240	2745	3645	5680	22.7	7290	9005	—
5.0	1125	1435	1960	—	23.7	2370	2900	3835	5965	23.7	7625	9510	11675
5.9	1150	1460	1995	—	24.7	2520	3080	4050	6310	24.7	8050	10060	12320
6.8	1175	1490	2040	—	25.7	2675	3260	4300	6715	25.7	8565	10720	13155
7.8	1205	1520	2090	—	26.6	2830	3465	4600	6720	26.6	9115	11400	14000
8.7	1240	1555	2145	—	27.6	3025	3750	4950	8325	27.6	9790	12250	15250
9.6	1275	1595	2200	—	28.7	3280	4070	5350	9035	28.7	10525	13300	16690
10.5	1310	1640	2255	—	29.7	3580	4420	5800	9200	29.7	11385	14550	—
11.3	1345	1685	2315	—	29.9	3630	4500	5900	9850	29.9	11660	14845	—
12.2	1380	1735	2380	—	30.7	3880	4780	6285	10815	30.7	12420	15850	—
13.1	1425	1785	2455	—	31.8	4200	5200	6870	11875	31.8	13705	17600	—
14.1	1480	1845	2540	—	32.9	4540	5690	7560	13175	32.9	15270	19300	—
15.0	1540	1905	2630	4155	34.0	4900	6240	8325	14525				
16.0	1610	1985	2730	4300	35.1	5260	6800	9180	—				
16.9	1680	2065	2835	4450	36.1	5650	7375	10090	—				
17.8	1755	2155	2948	4610	37.2	6050	8025	11075	—				



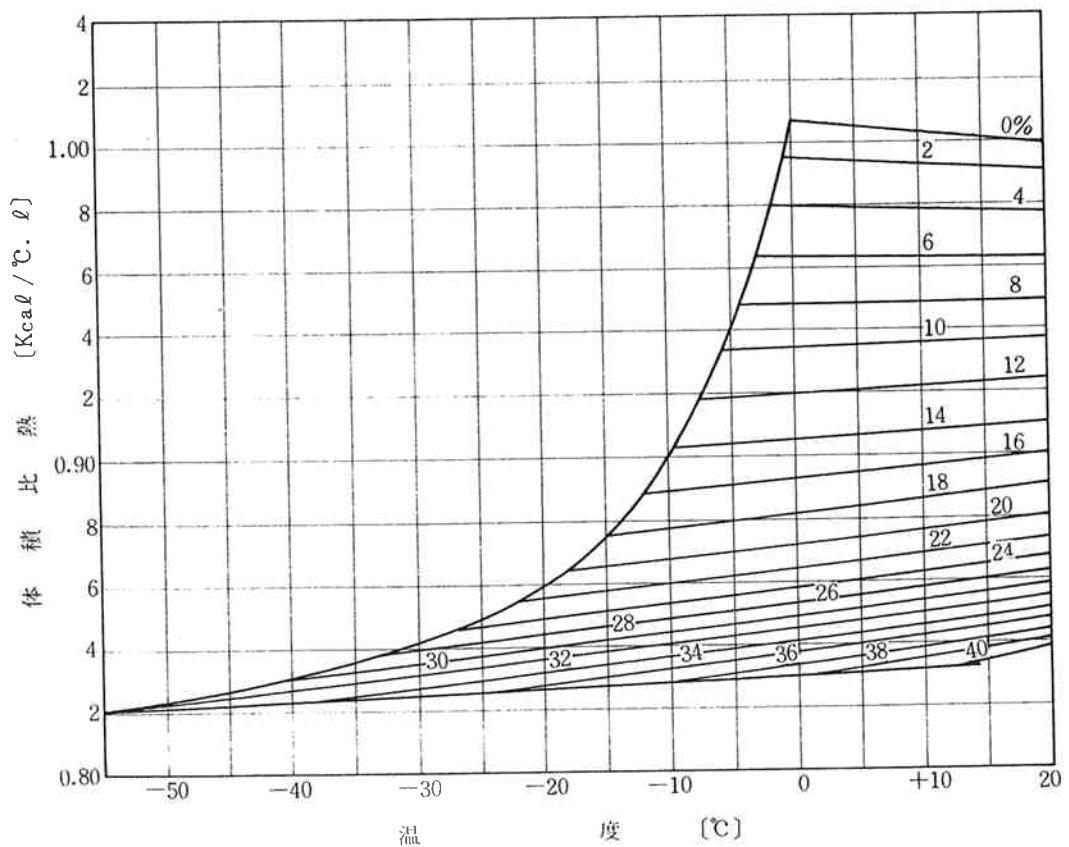
5. 塩化カルシウム水溶液の濃度—エンタルピー—線図⁷⁾

(但し BTU/lb 単位)



6. 塩化カルシウム水溶液の比熱^{4),5)}

%	C _p [cal/g·°C]									
	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	50°
0	—	—	—	—	1.005	1.001	0.999	0.998	0.998	0.999
2	—	—	—	—	0.976	0.975	0.974	0.973	0.972	0.971
4	—	—	—	—	0.945	0.946	0.946	0.947	0.947	0.948
6	—	—	—	—	0.914	0.916	0.917	0.919	0.920	0.922
8	—	—	—	—	0.885	0.888	0.890	0.893	0.895	0.898
10	—	—	—	—	0.858	0.860	0.863	0.866	0.871	0.872
12	—	—	—	—	0.830	0.848	0.838	0.842	0.846	0.850
14	—	—	—	—	0.803	0.808	0.813	0.818	0.823	0.828
16	—	—	—	0.774	0.779	0.784	0.789	0.795	0.800	0.805
18	—	—	—	0.751	0.756	0.762	0.768	0.773	0.779	0.784
20	—	—	—	0.729	0.735	0.741	0.746	0.752	0.758	0.764
22	—	—	0.704	0.710	0.716	0.722	0.728	0.734	0.740	0.746
24	—	—	0.687	0.693	0.699	0.705	0.711	0.717	0.723	0.729
26	—	0.665	0.671	0.677	0.683	0.689	0.695	0.701	0.708	0.714
28	0.644	0.650	0.656	0.662	0.668	0.674	0.680	0.686	0.692	0.698
30	0.630	0.636	0.642	0.648	0.654	0.660	0.666	0.672	0.678	0.684
32	—	0.621	0.627	0.633	0.639	0.645	0.651	0.658	0.665	0.671
34	—	—	—	0.620	0.626	0.633	0.639	0.646	0.652	0.659
36	—	—	—	—	0.613	0.620	0.627	0.633	0.640	0.647
38	—	—	—	—	—	0.606	0.614	0.621	0.628	0.635
40	—	—	—	—	—	—	0.602	0.609	0.617	0.624



7. 塩化カルシウム水溶液の蒸気圧と沸点⁵⁾

蒸 気 圧				沸 点			
%	P [mmHg]	%	P [mmHg]	%	b. t. [°C]	%	b. t. [°C]
40° C				9.09	101	53.95	134
0	55.2	19.10	48.2	14.16	102	55.25	136
2.26	55.1	20.52	46.5	17.76	103	56.50	138
2.92	55.0	23.15	45.5	20.54	104	57.68	140
4.01	54.9	27.66	40.2	22.72	105	58.81	142
6.69	54.6	32.79	34.7	24.58	106	59.90	144
10.01	42.2	38.50	27.8	26.15	107	60.96	146
12.57	52.0	44.70	20.7	27.80	108	61.99	148
14.66	50.4	50.90	13.9	29.23	109	63.03	150
16.27	49.7	56.30	11.1	30.55	110	64.04	152
50° C				31.88	111	65.03	154
0	92.4	22.66	75.3	33.20	112	66.02	156
3.10	90.4	28.32	66.3	34.47	113	67.00	158
5.50	90.2	29.01	65.0	35.73	114	67.95	160
7.58	88.9	33.90	55.4	36.95	115	68.91	162
9.01	88.5	36.60	48.6	38.12	116	69.84	164
11.59	86.8	41.50	38.4	39.24	117	70.74	166
12.72	86.2	46.40	30.5	40.34	118	71.65	168
13.94	85.7	51.40	22.7	41.38	119	72.54	170
16.24	83.0	56.30	16.3	42.40	120	73.41	172
19.00	80.4			43.38	122	74.28	174
68° C				44.44	124	75.08	176
0	149.3	22.09	124.0	47.97	126	75.89	178
1.94	149.3	23.70	119.3	49.59	128	76.47	179.5 (satd.)
2.25	149.2	26.24	112.8	51.12	130		
3.18	148.7	28.10	108.9	52.58	132		
5.51	146.8	30.40	100.0				
6.48	145.7	32.40	94.8				
6.69	145.0	36.45	81.5				
7.38	144.0	43.50	59.6				
10.36	141.3	47.66	48.0				
12.38	139.5	51.86	38.4				
19.93	129.0	56.10	28.7				
70° C							
0	233.8	27.22	175.6				
3.39	233.0	30.36	160.5				
5.75	228.0	35.54	134.0				
7.61	226.3	37.18	125.0				
8.08	227.0	40.86	107.2				
10.11	222.8	44.10	94.0				
12.92	217.2 (sic)	48.36	76.5				
15.85	211.4	52.19	60.0				
19.81	201.7	56.82	43.2				
24.13	186.8	57.92	42.1				
25.74	181.2						
80° C							
0	355.4	22.55	295.2				
2.48	352.1	24.07	287.6				
2.93	351.8	27.82	264.4				
3.61	351.0	31.30	240.9				
5.73	346.2	37.08	198.9				
5.87	346.0	40.81	170.6				
8.15	342.9	44.48	143.4				
11.60	334.6	49.70	112.8				
14.13	318.8	52.96	96.4				
15.40	313.7	57.32	75.5				
18.17	316.0	60.52	63.2				
20.20	304.1						

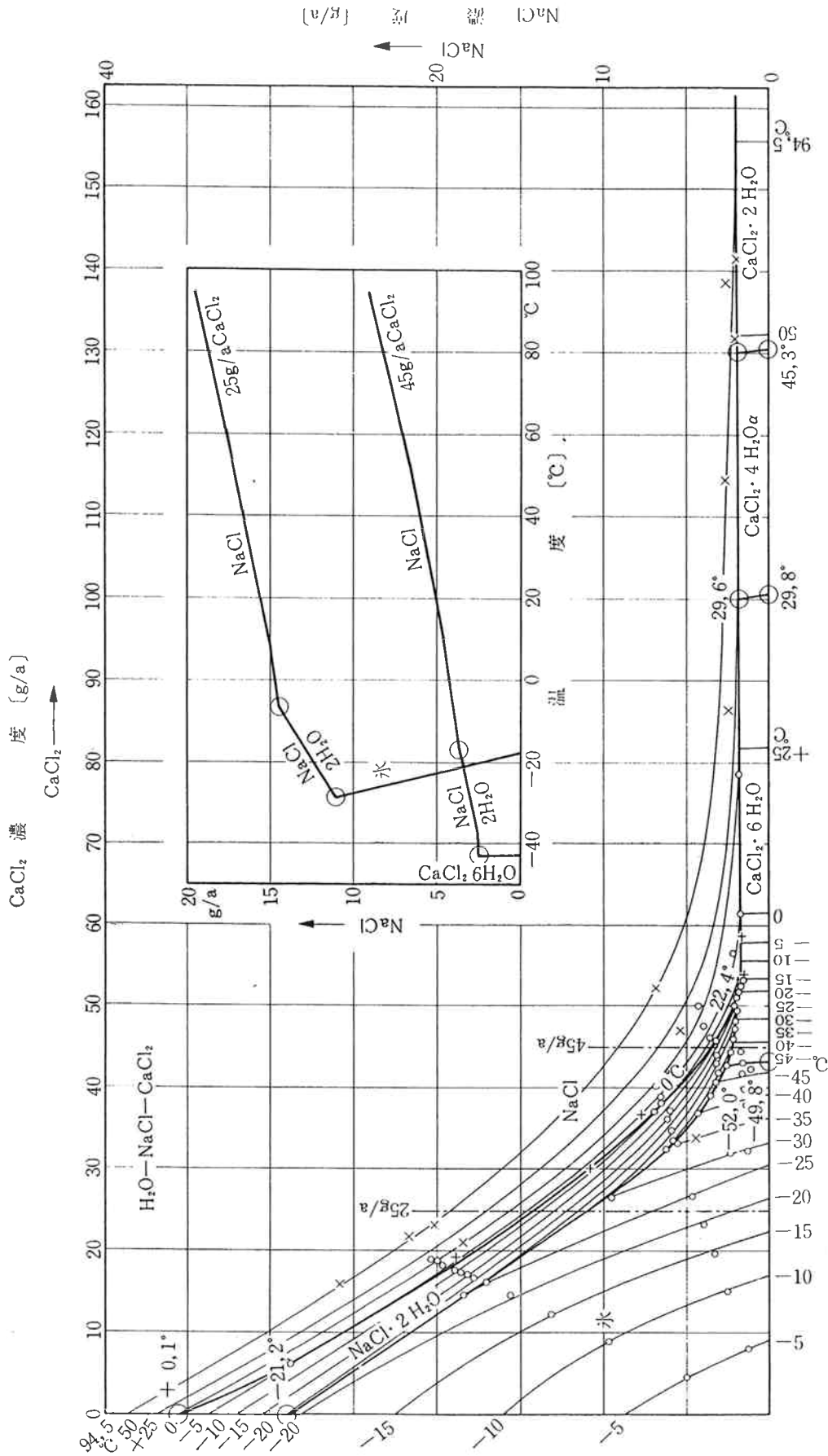
8. 塩化カルシウムの粘性係数および熱伝導率⁴⁾

15°Cにおける比重量 kg/l	15°Cにおける比重 °Bé	溶液中の塩含有量 100kgの含有量	凝固温度 °C	0°Cにおける比熱 kcal/kg	粘性係数 $\eta \cdot 10^4 \left[\frac{\text{kg} \cdot \text{s}}{\text{m}^2} \right]$							熱伝導率 $\lambda \frac{\text{kcal}}{\text{m} \cdot \text{h} \cdot ^\circ\text{C}}$							
					+20°	+10°	0°	-10°	-15°	-20°	-25°	-30°	0°	-10°	-20°	-30°	-40°	-50°	
1.02	3.0	2.5	-1.2	0.968	1.07	1.37	1.87	—	—	—	—	—	—	—	—	—	—	—	—
1.04	5.7	4.8	-2.4	0.932	1.11	1.41	1.96	—	—	—	—	—	—	—	—	—	—	—	—
1.06	8.3	7.1	-3.7	0.899	1.17	1.49	2.07	—	—	—	—	—	—	—	—	—	—	—	—
1.08	10.8	9.4	-5.2	0.866	1.26	1.58	2.20	—	—	—	—	—	—	—	—	—	—	—	—
1.10	13.2	11.5	-7.1	0.836	1.35	1.69	2.34	—	—	—	—	—	—	—	—	—	—	—	—
1.12	15.6	13.7	-9.1	0.808	1.46	1.82	2.52	—	—	—	—	—	—	—	—	—	—	—	—
1.14	17.8	15.8	-11.4	0.782	1.58	1.99	2.71	4.30	—	—	—	—	—	—	—	—	—	—	—
1.15	18.9	16.8	-12.7	0.770	1.66	2.08	2.82	4.45	—	—	—	—	—	—	—	—	—	—	—
1.16	20.0	17.8	-14.2	0.758	1.74	2.18	2.93	4.60	—	—	—	—	—	—	—	—	—	—	—
1.17	21.1	18.9	-15.7	0.747	1.84	2.28	3.05	4.76	6.27	—	—	—	—	—	—	—	—	—	—
1.18	22.1	19.9	-17.4	0.737	1.94	2.38	3.18	4.94	6.44	—	—	—	—	—	—	—	—	—	—
1.19	23.1	20.9	-19.2	0.727	2.04	2.50	3.34	5.17	6.72	—	—	—	—	—	—	—	—	—	—
1.20	24.1	21.9	-21.2	0.717	2.15	2.64	3.51	5.43	7.02	8.78	—	—	—	—	—	—	—	—	—
1.21	25.1	22.8	-23.3	0.708	2.27	2.78	3.69	5.72	7.34	9.19	—	—	—	—	—	—	—	—	—
1.22	26.1	23.8	-25.7	0.700	2.40	2.98	3.89	6.04	7.70	9.66	11.79	—	—	—	—	—	—	—	—
1.23	27.1	24.7	-28.3	0.692	2.53	3.10	4.10	6.39	8.09	10.19	12.40	—	—	—	—	—	—	—	—
1.24	28.0	25.7	-31.2	0.685	2.68	3.28	4.34	6.81	8.53	10.77	13.16	15.1	—	—	—	—	—	—	—
1.25	28.9	26.6	-34.6	0.678	2.83	3.46	4.61	7.22	9.04	11.39	13.98	16.2	—	—	—	—	—	—	—
1.26	29.8	27.5	-38.6	0.671	2.99	3.68	4.90	7.67	9.63	12.08	15.00	17.5	—	—	—	—	—	—	—
1.27	30.7	28.4	-43.6	0.664	3.20	3.94	5.22	8.18	10.28	12.94	16.25	19.2	—	—	—	—	—	—	—
1.28	31.6	29.4	-50.1	0.658	3.47	4.25	5.60	8.80	11.00	14.06	17.87	21.7	—	—	—	—	—	—	—
*1.286	32.3	29.9	-55.0	0.654	3.58	4.42	5.80	9.22	11.42	14.67	18.70	23.0	—	—	—	—	—	—	—
1.30	33.4	31.2	-41.6	0.645	3.97	4.96	6.46	10.25	12.84	16.50	21.50	24.3	—	—	—	—	—	—	—
1.32	35.1	33.0	-27.1	0.633	4.51	5.73	7.53	11.96	15.34	19.56	25.40	27.1	—	—	—	—	—	—	—
1.34	36.7	34.7	-15.6	0.621	5.09	6.60	8.82	14.08	18.48	—	—	—	—	—	—	—	—	—	—
1.36	38.3	36.4	-5.1	0.610	5.71	7.49	10.23	—	—	—	—	—	—	—	—	—	—	—	—

(5)

* 共晶点

9. $\text{CaCl}_2\text{—NaCl—H}_2\text{O}$ 平衡図³⁾



g/a.....水100gに対するg数

拡散定数¹⁾ 25°C

濃度 [mol/l]	0	0.001	0.002	0.005	0.1	0.5	1.0
$D \times 10^{-5}$ [cm ² /sec]	1.335	1.249	1.224	1.180	1.110	1.140	1.203

表面張力¹⁾ 25°C

濃度 [mol/l]	0.200	0.400	0.600	0.800	1.000	1.200	1.400
σ [dyn/cm]	72.50	73.13	73.60	74.25	75.05	75.70	76.40

希釈熱¹⁾ 25°C

$n_1 \rightarrow n_2$ へ希釈する場合の希釈熱
n (希釈度) 溶質 1 mol を溶かす溶媒の量 (水)

n_1	10	20	50	100	200	500	1000	5000
n_2	20	50	100	200	500	1000	5000	∞
Q [cal/mol]	-0.63*	-0.35	-0.20	-0.145	-0.120	-0.09	-0.019	-0.22

* 18°C

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