MELTING CURVES OF THE SYSTEMS HYDROGEN CHLORIDE–ETHYL ETHER AND HYDROGEN CHLORIDE–ACETONE.

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Melting curves of the system hydrogen chloride- ethyl ether was already studied by O. Maass and D. McIntosh[1] in 1913. These authors obtained a result that there exists three compounds $(HCl)(C_4H_{10}O)$, $(HCl)_2(C_4H_{10}O)$, and $(HCl)_5(C_4H_{10}O)$. I have recently studied this system again, together the system hydrogen chloride-acetone, and are described in the following.

The System Hydrogen Chloride–Ethyl Ether. A small quantity of pure dehydrated ether is introduced into a glass bulb of about 1.5 c.c. capacity and weighed. The bulb is then connected to a reservoir of pure dry hydrogen chloride gas, and cooled by liquid air. The hydrogen chloride condenses into the bulb, the quantity of which can roughly be estimated by the pressure change and the volume of the gas reservoir. The bulb is, then, hermetically sealed and is put in a bath of low temperature. The bath is made of a non-silvered Dewar vessel containing petroleum ether, which is cooled by

(1) Maass and McIntosh, *J. Am. Chem. Soc.*, 35 (1913), 537.

dropping liquid air. The melting of the mixture in the bulb can be seen from the outside of the vessel, and the temperature was measured by three series copper-constantan thermocouples which is kept by the side of the bulb.

The composition of the mixture was determined in the following manner. The bulb is taken out after the melting point was observed, and brought into a thick walled glass bottle which containing some water in it. The bottle is, then, shaken vigorously so that the bulb is broken and the hydrogen chloride gas is absorbed by the water. The hydrochloric acid solution thus produced is then titrated with alkali solution.

The results of the experiments are as follows.

Mol % of HCl.		Melt. pt.	Mol % of HCl.		Melt. pt.
0	(pure ether)	−117.7°	63.71		− 87.4°
10.84		−118.8	68.30		− 89.0
13.07		−119.3	72.61		− 93.5
20.32		−124.2	78.94		−100.4
22.67		−127.8	81.24		−104.0
31.96		−126.5	88.80		−113.5
36.34		−115.4	89.45		−115.5
40.45		−110.9	93.92		−123.6
47.87		−100.4	94.24		−123.7
49.03		−100.9	95.35		−120.8
52.82		−107.3	96.13		−120.5
55.16		− 94.5	100.00	(pure HCl)	−112.5
61.76		− 89.3			

Graphically it becomes as Fig. 1. From this figure it is evident that there exists only one compound $(HCl)_2(C_4H_{10}O)$ which melts at −87.3°.

The System Hydrogen Chloride–Acetone. The experimental procedure is quite same as the system mentioned above. The results are as follows.

Mol % of HCl.		Melt. pt.	Mol % of HCl.	Melt. pt.
0	(pure acetone)	− 94.5°	45.12	−81.7
14.43		−107.0	52.91	−80.0
20.50		−111.4	55.56	−82.7
27.29		−114.6	57.26	−86.6
31.78		−104.2	60.39	−92.8
42.99		− 85.7		

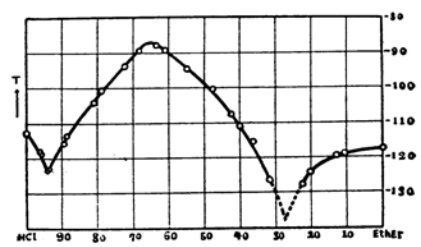

Fig. 1.

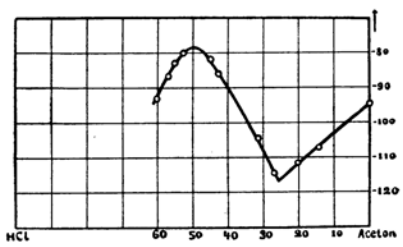

Fig. 2.

Graphically it becomes as Fig. 2. In this case, there is one compound (HCl) (C_3H_6O), whose melting point is $-79.0°$. In the part where the amount of hydrogen chloride exceeds 60 percent, the mixture became glassy mass by cooling and could not determine the melting point.

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