

Application of Two Component System KI-H₂O

Hons. Part (II) Paper III, Phase rule Lec-5

Dr. S.K. Jha.

Asst Prof (Guest)

Dept of Chemistry

Marwan College Dibrugarh.

Lesson 1

In this system there are two components i.e. KI (Potassium iodide) in solid state and the another is water which is in liquid state. Melting point of water is fixed i.e. 0°C at one atmospheric pressure but the melting point of KI is very high. As KI is mixed in H₂O its M.pt decreases and it reaches to -23°C. Phase rule diagram of KI & H₂O will be on the basis of reduced rule or condensed rule formula, where only two variables temperature & Composition is required to draw phase rule diagram of KI & H₂O.

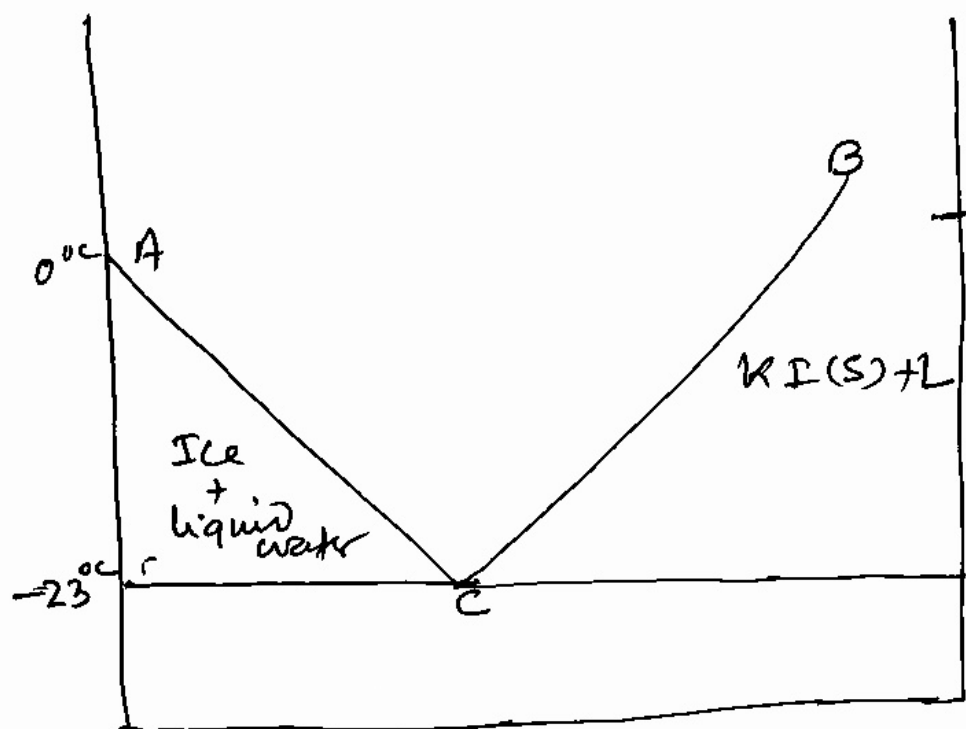
As per reduced phase rule

$$F = 3 - P$$

$$F = 3 - 3 = 0 \quad (P = \text{water, KI, and soln of KI}).$$

This degree of freedom is only for eutectic point.

(2)



In this phase diagram there are four areas or regions, and there are two curves AC & BC.

Along curve AC the system separates out from solution and system is monovariant.

$$C = 2 \quad (\text{KCl \& H}_2\text{O})$$

$$P = 2 \quad (\text{solid \& liquid phase}).$$

$$\text{So } F = C - P + 1 \quad (\text{Reduced phase rule})$$

$$= 2 - 2 + 1$$

$$= 1. \quad (\text{Monovariant}).$$

There are two curves as we have discussed previous also i.e AC & BC. This two curve meet at a point 'c' where all three phases i.e., solid KCl and their liquid solutions.

$$C = 2 \quad (\text{KCl \& H}_2\text{O})$$

$$P = 3 \quad (\text{Ice, KCl(s), \& its solution})$$

$$F = C - P + 1$$

$$= 2 - 3 + 1$$

$$= 0$$

In this diagram $F=0$, at c point. So this point is called Eutectic point and mixture of all three are called eutectic mixture.

Note: Whenever System contains Salt & water then the eutectic point is generally called ~~Cryot~~ Cryohydric point, in the phase diagram Cryohydric point is 'c', where the solution available is called Cryohydric solution & the temperature at which it happens that is called Cryohydric temperature. In the beginning the melting point of water was 0°C but when KCl is added in it

(4)

approx 32%. Then temperature of melting has lower down and it becomes -23°C which is called cryohydric temperature, at this condition temperature remain constant.

Chapter is over


20.04.20

