*. Two Component system :-

KI Water system :-

This is an example of two component system in which a simple eutectic mixture seperate as a solid phase. The melting point of the solute is much higher than the boiling point of water. If the pressure is not high then the solute is obtained in the solid state because when the melting point of pure solute is reached, most of the water is converted in to vapour phase.

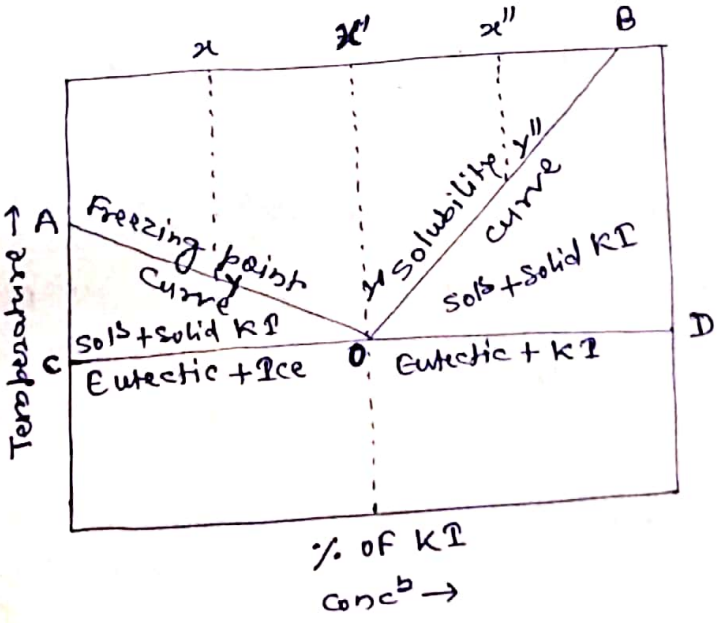
The four phases involved in the system are —

(1) Solid KI

(2) solution

(3) Ice

(4) Vapour



The equilibrium diagram consists of the following :-

1). Curves :- The point A is the freezing point of water under normal condition. On adding KI, the freezing point is lowered more & more till the point 'O' is reached. The point 'O' corresponds to the concentration of 52% KI. Along the curve AO, the three phases namely Soln, Ice & Vapour are in equilibrium. Hence, the degree of freedom is -

$$F = C - P + 2$$
$$= 2 - 3 + 2$$
$$= 1.$$

curve OB :-

It represent the solubility of KI in water at different temp^re of the system at 'O' is heated, Ice melts & solid KI passes in the solution to maintain its solution 52% of KI. when whole ice melts and further temperature is raised the excess of KI added follows the curve OB. The raised in the curve shows that the solubility of KI increase in the solution. The curve OB raise the curve & touch 100% KI axis because this point is the boiling point of saturated soln.

The curve OB represents the two components systems. Hence, the degree of freedom would be -

$$F = 2 - 3 + 2$$
$$= 1.$$

*. Cryohydric point :-

The eutectic point 'O' is also called Cryohydric point. because the two Component is solute and water. Since, the four phases viz. ice, solid, solute, soln & vapour are in equilibrium.

The degree of freedom is –

$$F = 2 - 4 + 2$$
$$= 0.$$

This point 'O' corresponds to a definite temp^re (251 K), composition (52% KI + 48% ice).

Here the eutectic solid is a mixture and not a compound because both the constituents lie as seperate crystals.

* Areas :-

Two phases i.e. saturated solution and Ice are in equilibrium in the region 'AOC', where as in 'BOD' region. In BOD region, saturated sol^n and solid KI phases are in equilibrium. In the system below the eutectic line COD, the two phases are Ice & solid KI with excess of Ice to the left of 'O' and excess of solid KI to the right of 'O'.

* Effect of Cooling for KI sol^n :–

If the sol^n is cooled gradually, along the line xy, no change in composition occurs because the system is ~~Invariant~~ bivariant. On reaching 'y', Ice starts seperating and the system now, ~~because~~ becomes univariant. On further cooling sol^n continues becomes more and more concentrated till the point 'O' is reached where KI also seperate out. Similarly a sol^n of composition x'' is cooled then KI seperates out untill the point 'O' is reached and the Ice also begins to deposite. Ultimetly,

the whole of the sols freezes to give eutectic mixture. finally when a sol of composition represented by 'x' is cooled. The temperature continues to fall along the line 'x'y' without any change in composition until the eutectic point 'O' is reached. The sols solidifies as a whole. i.e. Both PbI_2 & KI seperate out simultaneously.

So, all sols are cooling ~~[illegible]~~ so, no further change in temperature at eutectic point.

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