Deviation of Roult's law :—

The vapour pressure of a dilute solution is directly Proportional to the mole fraction of the Solvent.

Thus, $P \propto x_1$

or, $P = K \cdot x_1$

$= K \times \frac{n_1}{n_1 + n_2}$ —— (I)

Where x_1 is the mole fraction the Solvent.

n_1 = no. of moles of Solvent.

n_2 = " " " " Solute.

K = Proportionality Constant.

In the Case of Pure Solvent, if $n_2 = 0$

So, $P^\circ = K \times \frac{n_1}{n_1}$

because $n_2 = 0$.

So, $K = P^\circ$ —— (II)

Hence, from eq (I) and (II), we get

$P = P^\circ \times \frac{n_1}{n_1 + n_2}$

or, $\frac{P}{P^\circ} = \frac{n_1}{n_1 + n_2}$ —— (III)

or, $1 - P/P^\circ = 1 - \frac{n_1}{n_1 + n_2}$

or, $\frac{P^\circ - P}{P^\circ} = \frac{n_1 + n_2 - n_1}{n_1 + n_2}$

Condition for Henry's law :→ (i) The pressure of g is not too High (ii) Temperature is not too low. (iii) The gas is not highly soluble and does not enter into chemic reaction (iv) The gas does not dissociate

Applications of Henry's law :→

(i) In the production of carbonated beverage → To increase the solubility of CO_2 - in soft drink and soda Water the bottle is sealed under High pressure.

(ii) In Scuba diving or In deep sea diving → N_2 is more soluble than He in blood, the pressure is more in deep sea than the surface of earth. So, deep sea divers use oxygen diluted with less soluble He as a breathing gas to minimise the painful effect.

(iii) In the function of lungs → (iv) At high altitudes :-

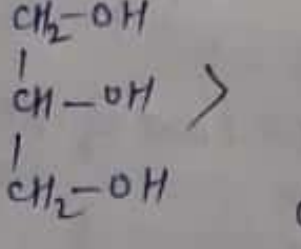
Vapour pressure (V.P) :→ The pressure exerted by the vapour molecules at the upper surface of liquid in equilibrium is called V.P. ✓factors on which the V.P depends →

(i) Intermolecular force :- $V.P \propto \frac{1}{\text{Intermolecular force}}$

larger the Inter molecular force of attraction between the liquid molecule lower will be the V.P and vice-versa.

eg Intermolecular force glycerol > ethylene glycol > H_2O > C_2H_5OH > $C_2H_5-O-C_2H_5$ (Diethyl ether)

i.e



I.M.F, > > H_2O > C_2H_5OH > $C_2H_5-O-C_2H_5$

So, V.P glycerol < Ethylene glycol < Water < ethyl alcohol < Diethyl ether.

(2) Temperature (T) :→ V.P ∝ Temp of liquid) With increasing Temperature (Thus) Kinetic energy of the molecule increases. Velocity of molecules