6. The vapour pressure of acetone at 20^0C is 185 torr. When 1.2 g of a non-volatile substance was dissolved in 100 g of acetone at 20ºC, its vapour pressure was 183 torr. The molar mass (g mol^{-1}) of the substance is:

   (1) 32 (2) 64 (3) 128 (d) 488

Answer:

We know $\frac{P_o - P_s}{P_s} = \frac{n}{M} \rightarrow (1)$

Here P_o =Vapaour pressure of acetone =185 torr.

P_s = Vapour pressure of solution =183 torr

$$n = number\ of\ moles\ non\ volatile\ substrace = \frac{Weight\ in\ gram}{Molecular\ Weight} = \frac{1.2}{M}$$

$$N = number\ of\ moes\ of\ acetone = \frac{Weight\ in\ gram\ of\ acetone}{Molecular\ Weight\ of\ acetone} = \frac{100}{58}$$

From equation (1): $\frac{185-183}{183} = \frac{\frac{1.2}{M}}{\frac{100}{58}}$

Or $\frac{2}{183} = \frac{1.2\times58}{M\times100}\ or\ M = \frac{1.2\times58\times183}{200} = 63.68 \sim 64$

Correct option is (2) 64