

Question:

Calculate minimum amount of water required to saturate a vessel of volume 41 ltrs at 300K.

vapour pressure of water at 300K = 38 torr.

$$\begin{aligned} T &= 300\text{K} \\ V &= 41\text{L} \end{aligned}$$

Ans:

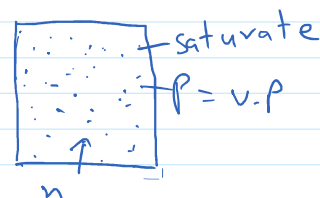
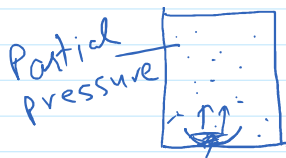
Ideal gas equation:

$$PV = nRT$$

$$\frac{38}{760} \times 41 = n \left( \frac{0.082}{1000} \right) (300\text{K})$$

$$n = \frac{1}{12} \text{ moles}$$

$$w = n \times M = \frac{1}{12} \times 18 = 1.5 \text{ g}$$



$$R = 0.082 \frac{\text{atm L}}{\text{mol K}}$$

Question: If 3gm water is kept in above container which is initially evacuated. Then find percentage of water evaporated.

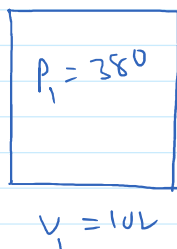
Ans: 1.5gm out of 3gm evaporates i.e 50%.

Question

An ideal gas at pressure of 380 torr is present in a vessel of volume 10L. Now it is transferred to another vessel of volume 5L at same temperature.

Find pressure of gas in new container.

Ans:



As temperature is constant, apply Boyle's law

$$P_2 V_2 = P_1 V_1$$

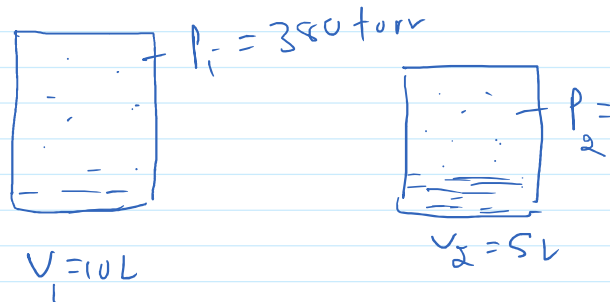
$$P_2 \times 5 = 380 \times 10$$

$$P_2 = 760 \text{ torr}$$

### Question

Water in liquid state is present in equilibrium with water vapours in a container of volume 10 L. Vapour pressure of water at given condition is 380 torr.

Now entire mixture is transferred into a container of volume 5 L. Find new vapour pressure of water, at same temperature. Neglect volume of liquid water.



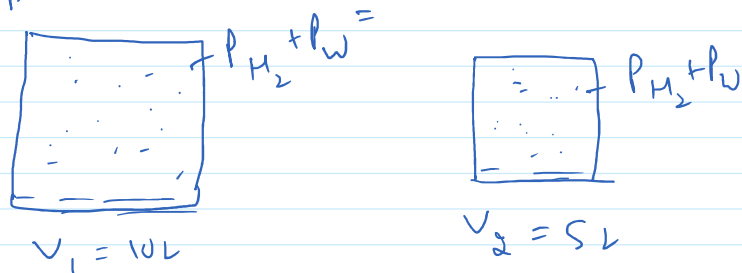
Ans: As vapour pressure remains same,  $P_2 = 380 \text{ torr}$ .

### Question

Liquid water and hydrogen mixture is present in a closed container of volume 10 L (neglect volume of liquid water). Total pressure in vessel is 780 torr.

Vapour pressure of water is 50 torr. Now contents of the vessel are transferred to a container of volume 5 L.

Find new pressure.



Ans:  $P_1 = P_{H_2} + P_w = 780$  (Dalton's law of partial pressure)

$$P_{H_2} + 50 = 780$$

$$P_{H_2} = 780 - 50 = 730 \text{ torr.}$$

Vessel 2

$P_2 = P_{H_2} + P_w = 730 + 50 = 780 \text{ torr}$

Vessel 2

$$P_{N_2} \times 5 = 730 \times 10 \quad (\text{Boyle's law})$$

$$P_{N_2} = 1460 \text{ torr}$$

$$P_w = 50 \text{ torr}$$

$$P_2 = 1460 + 50 = 1510 \text{ torr}$$