

Daily Tutorial Sheet 11

Numerical Value Type for JEE Main

126.(2) At same P & T

$$n \propto V$$

$$\therefore \qquad \frac{n_1}{n_2} = \frac{V_1}{V_2} \, \Rightarrow \, \frac{3}{3.1} = \frac{60}{V_2} \, \Rightarrow \, V_2 = 62L$$

Change in vol. = 2L

127.(9) At constant P & n,

$$V \propto T$$

$$\Rightarrow$$
 % change in V = % change in T

% change in
$$T = \frac{9}{100} \times 100 = 9\%$$

128.(3) Let the volume of bulb be V L

At 500K, Volume of gas becomes (V + 2)L

At constant P & n,

$$\frac{500}{300} = \frac{V+2}{V} \implies V = 3L$$

129.(4) At constant V & T,

As
$$P_2 / P_1 = n_2 / n_1 = 2 / 8$$

$$\Rightarrow \frac{n_2}{n_1} = \frac{1}{4}$$

$$\therefore \frac{Initial \, mass}{Final \, mass} = 4:1$$

130.(8) Let the volume of
$$CH_4$$
 leaked in 2 sec be x mL $\frac{\text{Rate of effusion of He}}{\text{Rate of effusion of CH}_4} = \frac{P_{\text{He}}}{P_{\text{CH}_4}} \sqrt{\frac{M_{\text{CH}_4}}{M_{\text{He}}}}$

$$\Rightarrow \frac{16/4}{x/2} = \frac{1}{2}\sqrt{\frac{16}{4}} \Rightarrow x = 8 \text{ mL}$$

131.(4) Let the no. of molecules moving with

Speed of $3\,\mathrm{ms}^{-1}$ be $\,\mathrm{n}_1$

Speed of
$$7 \, \text{ms}^{-1}$$
 be n_2

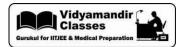
So,
$$n_1 + n_2 = 10$$

Also,
$$C_{rms} = \sqrt{\frac{n_1 C_1^2 + n_2 C_2^2}{n_1 + n_2}} = 5$$

$$\Rightarrow$$
 $9n_1 + 49n_2 = 25n_1 + 25n_2$

$$\Rightarrow \qquad n_1 = \frac{3}{2}n_2$$

or,
$$n_1 = 6 \& n_2 = 4$$



132.(4)
$$\frac{r_{CH_4}}{r_{M(CO)_x}} = \sqrt{\frac{63.29 + 28x}{16}}$$

$$\Rightarrow \qquad 3.31 = \sqrt{\frac{63.29 + 28x}{16}}$$

Solving for x, we get

$$x \simeq 4$$

133.(3) Vapour density =
$$\frac{\text{Mol.wt.}}{2}$$

$$\therefore$$
 Mol. Wt. of $O_n = 48 \text{ gm/mol}$

$$\Rightarrow$$
 n = 3

134.(6) Let the Mol. Wt. of substance be M_0 g/mol

$$\therefore \qquad \frac{\text{Rate of effusion of substance}}{\text{Rate of effusion of O}_2} = \sqrt{\frac{32}{M_0}}$$

$$\Rightarrow \qquad (0.4216)^2 = \frac{32}{M_o}$$

$$\Rightarrow$$
 $M_o = 180 g / mol$

As density of substance = 0.3 g/L

$$\therefore \qquad \text{Vol. of 1 mole} = \frac{180 \text{ g/mol}}{0.3 \text{ g/L}} = 600 \text{L}$$

or,
$$6 \times 10^2 \,\mathrm{L}$$

So,
$$a = 6$$

135.(2) At constant P & V,

$$\mathbf{n}_1 \mathbf{T}_1 = \mathbf{n}_2 \mathbf{T}_2$$

$$\Rightarrow$$
 $n_1 \times 300K = n_2 \times 600K$

$$\Rightarrow n_1 \times 300 \text{K} = n_2 \times 600 \text{K}$$

$$\Rightarrow \frac{n_1}{n_2} = \frac{2}{1}$$

136.(4) Since final pressure $=\frac{1}{2}$ Initial pressure

$$\therefore \qquad \qquad n_{A_3O_n} = 1 \, \text{mole}$$

$$\Rightarrow$$
 no. of moles of O_2 in $A_3O_n = \frac{n}{2}$

no. of moles of $\,{\rm O}_2\,$ initially taken = 2

$$\Rightarrow \frac{n}{2} = 2 \Rightarrow n = 4$$

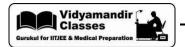
137.(4) $PV_m = Pb + RT$ (at high pressures)

For the plot between PV_{m} vs P,

Intercept =
$$RT = 22.16 L - atm$$

$$\therefore$$
 0.08 × T = 22.16 L – atm

$$\Rightarrow$$
 T = 277K or 4°C



138.(2) When the two boxes A & B interconnected, the pressure in both the boxes become same.

$$\begin{array}{ccc} : & & P \times V_A = n_A \times R \times 300 \\ & & P \times 4V_A = n_B \times R \times 600 \\ \\ \Rightarrow & & \frac{V_A}{4V_A} = \frac{n_A}{n_B} \times \frac{300}{600} \\ \\ \Rightarrow & & \frac{n_B}{n_A} = \frac{2}{1} \end{array}$$

139.(3) Density of vapours = 0.36 g/L

Molar mass of vapours = 18 g/mol

$$\therefore \qquad \text{Molar volume } = \frac{\text{Molar Mass}}{\text{Density}}$$

$$\Rightarrow \qquad \text{Molar volume } = \frac{18g \, \text{mol}^{-1}}{0.36 \, \text{g} \, / \, \text{L}} = 50 \, \text{L} \, \text{mol}^{-1}$$

 \therefore Molar volume is 5000 m³ or 5×10^3 m³

So, value of a = 3

140.(4)
$$\mu_{rms} = \sqrt{\frac{3RT}{M}}$$

$$\therefore \qquad \mu_{\rm rms} \propto \sqrt{T} \, \propto \sqrt{P} \qquad \qquad (at \ constant \ V \ \& \ n)$$

∴ Pressure increases by 4 times

So,
$$\frac{P_f}{P_i} = \frac{4}{1}$$

Solution | Workbook-1 24 States of Matter