Daily Tutorial Sheet-1	Level – 1

1.(A) 1 atm = 1.01×10^5 N / m^2 = 760 mm of Hg = 1.01×10^5 Pa

Note : Pound is a unit of mass and not force. Pressure is force per unit area and not mass per unit area.

2.(B) $(M_0)_{gas} = 2 \times V.D = 2 \times 11.2 = 22.4$

$11.2g \text{ gas} \equiv \frac{11.2}{22.4} = 0.5 \text{ mol gas} \equiv 11.2lt$ (at STP.)

3.(C) Use $\frac{P_1}{P_2} = \frac{T_1}{T_2}$ (at n, v ≡ const.) $\Rightarrow P_2 = \left(\frac{T_2}{T_1}\right) P_1 = \frac{40}{20} \times 2 = 4$ atm

4.(B) $\frac{r_{H_2}}{r_{O_2}} = \sqrt{\frac{M_{O2}}{M_{H_2}}} \quad \Rightarrow \quad \frac{n_{H_2} / t}{n_{O_2} / t} = \sqrt{\frac{32}{2}}$

$\Rightarrow \quad \frac{g_{H_2} / (M_0)_{H_2}}{g_{O_2} / (M_0)_{O_2}} = \sqrt{\frac{32}{2}} = 4 \quad \Rightarrow \quad \frac{g_{H_2} / 2}{4 / 32} = 4 \quad \Rightarrow \quad g_{H_2} = 1g$

5.(C) Use $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad \Rightarrow \quad P_2 = \frac{P_1V_1}{T_1} \times \frac{T_2}{V_2} = \frac{5 \times V_1}{273\,1} \times \frac{819\,3}{(V_1 / 3)} = 45$ atm

6.(D)

7.(C) $(n_{gases})_{total} = n_{H_2} + n_{He} + n_{NO} = \frac{1}{2} + \frac{2}{4} + \frac{3}{30} = 0.5 + 0.5 + 0.1 = 1.1$

$\Rightarrow \quad P = \frac{nRT}{V} = \frac{1.1 \times 0.08 \times 300}{1.1} \simeq 24$atm

8.(D) At same temperature, K.E will be equal

9.(A) Total K.E = $\frac{3}{2}$ nRT $\quad \Rightarrow \quad 0.3 \times T_{He} = 0.4 \times 400 \quad \Rightarrow \quad T_{He} = \frac{1600}{3} = 533.33$ K

10.(D) $C \propto \frac{T}{\sqrt{M}} \quad \Rightarrow \quad u_1 \propto \frac{T}{\sqrt{m_1}}$ and $u_2 \propto \frac{T}{\sqrt{m_2}} \quad \Rightarrow \quad u_1\sqrt{m_1} = u_2\sqrt{m_2} \quad \Rightarrow \quad m_1u_1^2 = m_2u_2^2$

11.(B)

$r_{H_2} = \frac{50ml}{20\,min} \propto \frac{P_{H_2}}{\sqrt{M_{H_2}}}$ $\quad (P_{H_2} = P_{O_2} \because \text{similar conditions})$

$r_{O_2} = \frac{40ml}{t\,min} \propto \frac{P_{O_2}}{\sqrt{M_{O_2}}}$ $\quad \Rightarrow \quad \frac{50 / 20}{40 / t} = \sqrt{\frac{32}{2}} \quad \Rightarrow \quad \frac{50t}{40 \times 20} = 4 \quad \Rightarrow \quad t = 64$ min

12.(B) $K.E_{avg}$ per molecule $= \frac{3}{2}$ KT $= \frac{3}{2} \times 1.38 \times 10^{-23} \times 298 \sim 6.17 \times 10^{-21}$ J

13.(A) K.E per unit volume is $\frac{3}{2}$P

14.(A) Root mean square velocity $\left(\sqrt{\frac{3RT}{M}}\right)$ is higher than most probable velocity $\left(\sqrt{\frac{2RT}{M}}\right)$

15.(C) $\left(C_{rms}\right)_{O_2} = \sqrt{\frac{3 \times 8.314 \times 300}{32 \times 10^{-3}}}$ (Note : M_0 has to be in kg/mol and not g/mol)