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CHEM 141-CH5-ASSIGNMENT

- ① 80.2 L
- ② 3.16 g/L
- ③ 26 atm
- ④ 72.1 g/mol
- ⑤ C_4H_{10}
- ⑥ 239 torr
- ⑦ 25.9 mL
- ⑧ 1.4 moles/minute
- ⑫ 2.24 L
- ⑮ 27.1 atm.

- ⑯ T
- ⑰ F
- ⑱ F
- ⑲ F
- ⑳ T

Q2:-

$$P = 1 \text{ atm}$$

$$T = 273 \text{ K}$$

$$\mu \text{ of } \text{Cl}_2 = (35.45 \times 2) = 70.90 \text{ g/mol}$$

$$d = ??$$

$$d = \frac{P \mu}{RT}$$

$$= \frac{(1 \text{ atm}) \left[\frac{70.90}{(35.45 \times 2)} \text{ g/mol} \right]}{\left(0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \right) \times (273 \text{ K})}$$

$$= 3.1633$$

$$= \boxed{3.16 \text{ g/L}}$$

Q3:-

$$V = 1.5 \text{ L}$$

$$m = 76 \text{ g}$$

$$P = ??$$

$$T = -37^\circ\text{C} + 273 = 236 \text{ K}$$

$$\mu (\text{F}_2) = (2 \times 19.00) = 38.00 \text{ g/mol}$$

$$P = \frac{m R T}{\mu V}$$

$$= \frac{76 \text{ g} \times \left(0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \right) \times 236 \text{ K}}{38.00 \text{ g/mol} \times 1.5 \text{ L}}$$

$$= 25.83$$

$$= \boxed{26 \text{ atm}}$$

Q4 :-

$d = 4.95 \text{ g/L}$

$T = -35^\circ\text{C} + 273 = 238 \text{ K}$

$P = 1020 \text{ torr}$

$P = 1020 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}} = 1.342105 \text{ atm}$

$\mu = ??$

$$\mu = \frac{dRT}{P} = (4.95 \text{ g/L}) \left(0.0821 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}} \right) (238 \text{ K})$$

(1.342105 atm)

$\mu = 72.06 = 72.1 \text{ g/mol}$

Q8 :- From Graham's law :-

$$\frac{\text{Rate He}}{\text{Rate O}_2} = \sqrt{\frac{\text{Molar Mass O}_2}{\text{Molar Mass He}}}$$

$$\frac{4.0}{\text{Rate O}_2} = \sqrt{\frac{32.00 \text{ g/mol}}{4.003 \text{ g/mol}}}$$

$$\text{Rate O}_2 = 1.4 \text{ moles per minute}$$

$$1.4 \text{ moles per minute}$$

Q 15:-

$$n = 1 \text{ mol}$$

$$T = 27 + 273 = 300 \text{ K}$$

$$a = 4.17 \text{ L}^2 \cdot \text{atm} / \text{mol}^2 \quad V = 750 \text{ mL} = 0.750 \text{ L}$$

$$b = 0.0371 \text{ L/mol} \quad R = 0.0821 \text{ L} \cdot \text{atm} / \text{mol} \cdot \text{K}$$

$$\left(P + \frac{n^2 a}{V^2} \right) (V - nb) = nRT$$

$$P = \left[\frac{nRT}{V - nb} \right] - \frac{n^2 a}{V^2}$$

$$= \left[\frac{(1 \text{ mol}) \times 0.0821 \text{ L} \cdot \text{atm} / \text{mol} \cdot \text{K} \times 300 \text{ K}}{0.750 \text{ L} - 1 \text{ mol} \times 0.0371} \right] - \frac{(1 \text{ mol})^2 \times 4.17 \text{ L}^2 \cdot \text{atm} / \text{mol}^2}{(0.750 \text{ L})^2}$$

$$P = 27.1 \text{ atm}$$