

$$1. PV = nRT$$

$$P = \frac{nRT}{V}$$

$$n = \frac{\text{mass}}{\text{MM}} = \frac{63}{44} = 1.432$$

$$P = \frac{1.432 \times 8.314 \times 384.15}{0.00468}$$

$$P = \frac{977131.2}{101325} \text{ Pa}$$

$$P = 9.644 \text{ atm}$$

$$2. P = h \rho g$$

$$= 5.95 \text{ cm} = 0.595 \text{ mm}$$

$$5.95 \text{ cm} = 5.95 \times 10 = 59.5 \text{ mm}$$

$$P_{\text{gas}} = 749.5 \text{ mmHg} - 59.5 \text{ mmHg}$$

$$= 690 \text{ mmHg}$$

$$3. \frac{T_A}{T_B} = \sqrt{\frac{M_A}{M_B}}$$

$$\frac{10.7}{2.42} = \sqrt{\frac{M_x}{M_{H_2}}} \Rightarrow$$

$$(4.421)^2 = \frac{M_x}{2}$$

$$M_x = 2 \times (4.421)^2$$

$$M_x = 39.099$$

$$\text{Molar Mass of Unknown gas} = 39.0$$

$$N_2O = (4 \times 2) + 16$$

$$= 28 + 16$$

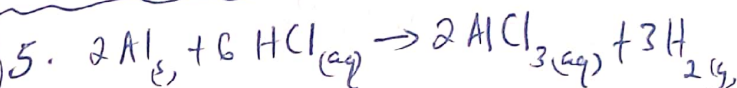
$$= 44$$

$$4. \frac{V_1 P_1}{T_1} = \frac{V_2 P_2}{T_2}$$

$$\frac{10 \times 124200}{352} = \frac{V_2 \times 101325}{273}$$

$$V_2 = \frac{10 \times 124200 \times 273}{101325 \times 352}$$

$$V_2 = 9.507 \text{ L or } 9507 \text{ cm}^3$$



$$P_{\text{total}} = P_{H_2O} + P_{H_2}$$

$$P_{H_2} = 751 - 26.8 = \frac{724}{760} \text{ mmHg} = 0.953 \text{ atm}$$

$$n = \frac{PV}{RT} = \frac{0.953 \times 0.0395}{0.082057 \times 300}$$

$$= 0.001529 \text{ moles of } H_2$$

$$\text{Moles of Al} = \frac{2}{3} \times 0.001529$$

$$= 0.00102 \text{ moles}$$

$$\text{Mass} = \text{moles} \times \text{MM}$$

$$= 0.00102 \times 27$$

$$= 0.02752 \text{ g}$$

6.

$$6. a). n = \frac{PV}{RT} =$$

$$950.6 \text{ torr} = 126736.24 \text{ Pa.}$$

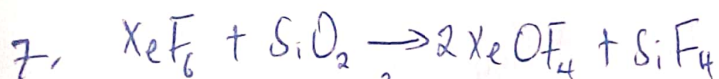
$$n = \frac{126736.24 \times 0.021}{8.314 \times 319.15}$$

$$n = 1.003 \text{ moles.}$$

$$b) P(\text{SO}_2) = \frac{2.37 \times 10^3}{10^6} \times P.$$

$$= 2.37 \times 10^{-3} \times 126736.24$$

$$= 300.36 \text{ Pa.}$$



$$V = 0.001 \text{ m}^3$$

$$M = 7.85 \text{ g.}$$

$$\text{MM} = 245.28$$

$$n = \frac{7.85}{245.28} = 0.032 \text{ moles (XeF}_6\text{)}$$

$$n(\text{SiF}_4) = \frac{1}{2} \times 0.032 = 0.016 \text{ moles}$$

$$P = \frac{nRT}{V} = \frac{0.016 \times 8.314 \times 298.15}{0.001}$$

$$P = 39661.12 \text{ Pa.}$$

$$8. p = 654 \text{ torr} = 87192.8 \text{ Pa.}$$

$$T = 291.15 \text{ K.}$$

$$P = \frac{nRT}{V} \Rightarrow P = dRT \quad d = \frac{P}{RT}$$

$$d = \frac{87192.8}{8.314 \times 291.15} = \frac{36.021 \text{ mol/m}^3}{1000}$$

$$d = 0.03602 \text{ mol/L.}$$

$$\frac{4 \text{ L}}{273.15} \left\{ \frac{319.15}{319.15} \right\}$$

$$9. \text{STP}$$

$$P = 101325 \text{ Pa.}$$

$$T = 273.15 \text{ K.}$$

$$\text{MM}(\text{AsH}_3) = 77.95$$

$$V = 0.568 \text{ L} = 5.68 \times 10^{-4} \text{ m}^3.$$

$$n = \frac{PV}{RT} = \frac{101325 \times 5.68 \times 10^{-4}}{8.314 \times 273.15}$$

$$n = 0.0253 \text{ moles.}$$

$$10. PV = nRT$$

$$V = \frac{m}{d}.$$

$$P \times \frac{m}{d} = nRT$$

$$\text{MM} = \frac{m}{n}$$

$$\frac{Pm}{d} = nRT$$

$$\frac{Pm}{dn} = RT$$

$$\frac{P \times \text{MM}}{d} = RT$$

$$dRT = P \times \text{MM}$$

$$d = \frac{P \times \text{MM}}{RT}$$

$$d = \frac{101325 \times 77.95}{8.314 \times 273.15}$$

$$d = \frac{3477.94 \text{ g/m}^3}{1000} = 3.478 \text{ kg/m}^3.$$

11. a). $m = 31g$.

$$P = \frac{0.667}{0.289} - 0.378 \text{ atm. (CO}_2\text{)}$$

$$P(\text{Kr}) = 0.289 \text{ atm.}$$

$$\begin{aligned} \text{Mole fraction (Kr)} &= \frac{\text{Partial pressure}}{\text{total pressure.}} \\ &= \frac{0.289}{0.667} = 0.433 \end{aligned}$$

$$m(\text{total}) = m(\text{Kr}) + m(\text{CO}_2).$$

$$m(\text{total}) = n(\text{Kr}) \times MM(\text{Kr}) + n(\text{CO}_2) \times MM(\text{CO}_2)$$

$$31 = n \times 0.433 \times 83.8 + 0.567 \times 44.01 \times n$$

$$31 = 36.2854n + 24.95367n$$

$$\frac{31}{61.23907} = \frac{61.23907n}{61.23907}$$

$$n = 0.5062 \text{ moles.}$$

$$\begin{aligned} m(\text{CO}_2) &= n \times MM \times \text{mole fraction.} \\ &= 0.5062 \times 44.01 \times 0.567 \\ &= ~~24.28g~~ \cdot 12.63g. \end{aligned}$$

$$\begin{aligned} \text{b) } m(\text{Kr}) &= n \times \text{mole fraction} \times MM \\ &= 0.433 \times 0.5062 \times 83.8 \\ &= 18.38g. \end{aligned}$$

12. $V(\text{Ar}) = 0.6L = 6 \times 10^{-4} \text{ m}^3$.

$$P = 1.39 \text{ atm} = 140841.8 \text{ Pa.}$$

$$T = 224^\circ\text{C} = 497.15\text{K}$$

$$n = \frac{PV}{RT} = \frac{140841.8 \times 0.0006}{8.314 \times 497.15}$$

$$n(\text{Ar}) = 0.02044 \text{ moles.}$$

$$V(\text{O}_2) = 0.2L = 2 \times 10^{-4} \text{ m}^3$$

$$T = 415.15\text{K.}$$

$$n = \frac{PV}{RT} \quad P = 510 \text{ torr} = 67994.4$$

$$n = \frac{67994.4 \times 0.0002}{8.314 \times 415.15}$$

$$n(\text{O}_2) = 0.00394 \text{ moles}$$

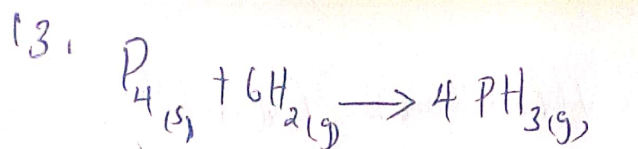
$$\begin{aligned} n_{\text{total}} &= 0.02044 + 0.00394 \\ &= 0.02438 \text{ moles.} \end{aligned}$$

$$V = 0.4L = 4 \times 10^{-4} \text{ m}^3.$$

$$T = 26^\circ\text{C} = 299.15\text{K.}$$

$$P = \frac{nRT}{V} = \frac{0.02438 \times 8.314 \times 299.15}{0.0004}$$

$$P = 151590.76 \text{ Pa.}$$



$$V(H_2) = 76.80 \text{ L} = 0.07680 \text{ m}^3$$

$$P = 101325 \text{ Pa}$$

$$T = 273.15 \text{ K}$$

$$n = \frac{PV}{RT} = \frac{101325 \times 0.07680}{8.314 \times 273.15}$$

$$(H_2) n = \cancel{0.3552 \text{ moles}} \cdot 3.427 \text{ moles}$$

$$m(P_4) = 11.0 \text{ g}$$

$$MM(P_4) = 123.9$$

$$n(P_4) = \frac{m}{MM} = \frac{11}{123.9} = 0.0888 \text{ moles}$$

Since $P:H = 1:6$

P_4 limiting reactant

$$n(PH_3) = 4 \times 0.0888 = 0.3552 \text{ moles}$$

$$m = n \times MM = 0.3552 \times 34$$

$$m(PH_3) = 12.08 \text{ g}$$

14. A $1 \text{ atm} = 760 \text{ mm Hg}$
 $1.055 \text{ atm} = ?$

$$\frac{1.055 \times 760}{1} = 801.8 \text{ mm Hg}$$

B. $1 \text{ Bar} = 750 \text{ torr}$
 $? = 644 \text{ torr}$

$$\frac{1 \times 644}{750} = 0.8587 \text{ bar}$$

c. $1 \text{ atm} = 101325 \text{ Pa}$
 $? = 649000 \text{ Pa}$

$$\frac{649000 \times 1}{101325}$$

$$= 6.405 \text{ atm}$$

D. $1 \text{ atm} = 101325 \text{ Pa}$

$$1 \text{ atm} = 760 \text{ mm Hg}$$

$$\left(\frac{845}{760} \times 1 \right) \text{ atm}$$

$$1 \text{ atm} = 101325 \text{ Pa}$$

$$\frac{845}{760} \text{ atm} = ?$$

$$\frac{845}{760} \times 101325$$

$$= 112657.40 \text{ Pa}$$

$$= 112.7 \text{ kPa}$$

15. $V = 6.84 \text{ L} = 0.00684 \text{ m}^3$

$$P = 426 \text{ torr} = 56795.3 \text{ Pa}$$

$$T = 298.15 \text{ K}$$

$$n = \frac{PV}{RT} = \frac{56795.3 \times 0.00684}{8.314 \times 298.15}$$

$$n = 0.1567 \text{ moles}$$

16. Density of $Hg.$ = $13.5 \times$ density of water

$$= 13.5 \times 1$$

$$= 13.5 \text{ g/mL}$$

Atmospheric pressure = 778 mm Hg ,

$\therefore$ Water rises to = 778×13.5

$$= \frac{10503 \text{ mm}}{1000}$$

$$= 10.503 \text{ m}$$

Ans. = $10503 \text{ mm H}_2\text{O}$.

17. $\frac{h_{H_2O}}{h_{Hg}} = \frac{d_{Hg}}{d_{H_2O}}$

$$h_{H_2O} = \frac{h_{Hg} \times d_{Hg}}{d_{H_2O}}$$

$$= \frac{13.5 \times 70.2}{1}$$

$$= 947.7 \text{ cm H}_2\text{O}$$