

Chapter 15 § 16

1. How Many moles of Magnesium are represented by 3.01×10^{22} atoms of Mg?

1 mole contains 6.022×10^{23} atoms

$$\begin{array}{rcl} 1 & \xrightarrow{\quad} & 6.022 \times 10^{23} \\ & \times & \\ ? & \xrightarrow{\quad} & 3.01 \times 10^{22} \end{array}$$

$$\begin{aligned} &= \frac{3.01 \times 10^{22}}{6.022 \times 10^{23}} \times 1 \\ &= 0.05 \text{ moles.} \end{aligned}$$

2. Find the Mass in 7.55 Moles of LiBr.

1 mole of LiBr contains 86.85g

$$\begin{array}{rcl} 1 \text{ mol} & \text{---} & 86.85 \\ 7.55 \text{ moles} & \times & ? \end{array}$$

$$\begin{aligned} &= \frac{7.55 \times 86.85}{1} \\ &= 655.72 \text{ g} \end{aligned}$$

3. Convert 5.73×10^{23} molecules of F_2 to moles.

1 mole of F_2 contains $[(6.022 \times 10^{23}) \times 2]$

$$\begin{array}{rcl} 1 \text{ mol} & \xrightarrow{\quad} & 1.2044 \times 10^{24} \\ & \times & \\ ? & \xrightarrow{\quad} & 5.73 \times 10^{23} \end{array}$$

$$\begin{aligned} &= \frac{5.73 \times 10^{23}}{1.2044 \times 10^{24}} \times 1 \\ &= 0.4758 \text{ moles} \end{aligned}$$

4. How many moles of Argon are present in 11.2 g of Ar?

1 mole contains 39.95 g

$$\begin{array}{l} 1 \quad \xrightarrow{\quad} 39.95 \text{ g} \\ ? \quad \xrightarrow{\quad} 11.2 \text{ g} \end{array}$$

$$= \frac{11.2 \text{ g}}{39.95} \times 1$$

$$= 0.2804 \text{ moles.}$$

5. How many moles of Lead is 4.35×10^{24} atoms of Pb?

1 mole of Pb contains 6.02×10^{23}

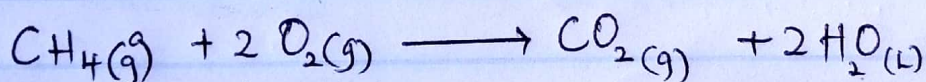
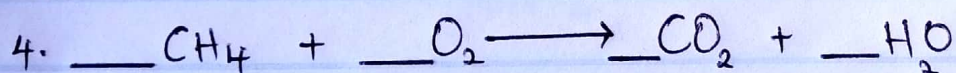
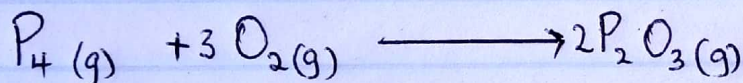
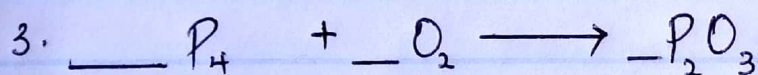
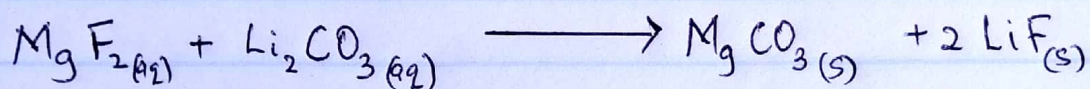
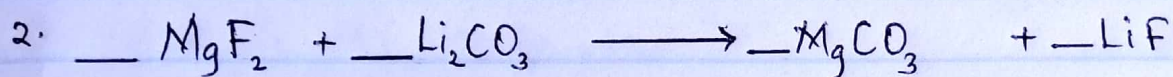
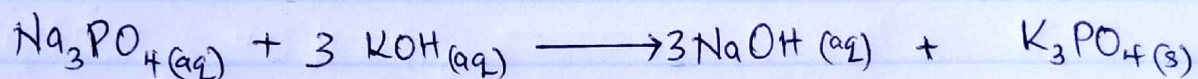
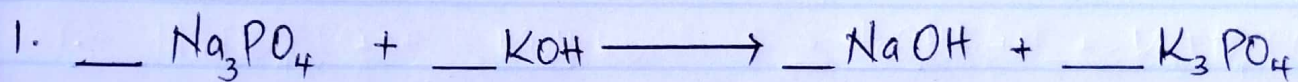
$$\begin{array}{l} 1 \text{ mol} \quad \rightarrow 6.02 \times 10^{23} \\ ? \quad \rightarrow 4.35 \times 10^{24} \end{array}$$

$$= \frac{4.35 \times 10^{24}}{6.02 \times 10^{23}} \times 1$$

$$= 7.2259 \text{ moles.}$$

Ans.

Chapter 11 : Chemical Reactions : Balance each of the following reactions.



Chapter 13 814 : Gas laws : Solve the following Problems using the ideal gas law.

$$P \times V = n \times R \times T$$

$$R = 0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \text{ or } 8.314 \frac{\text{J} \cdot \text{KPa}}{\text{mol} \cdot \text{K}}$$

1. Neon gas is at a pressure of 9.3 atm and a volume of 6.45 Litres. If 4.0 moles of the gas are present, what is the temperature?

$$P \times V = n \times R \times T$$

$$P = 9.3 \text{ atm}$$

$$V = 6.45 \text{ L}$$

If 4 moles of Neon gas are present What is the temperature

$$n = 4$$

$$R = 0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$$

$$T = \frac{P \times V}{n \times R} = \frac{9.3 \times 6.45}{4 \times 0.0821}$$

$$T = 18.27 \text{ K}$$

2. An unknown quantity of gas is at a pressure of 153 kPa a volume of 43.3 Liters, and a temperature of 87°C. How many moles of gas are present?

$$P = 153 \text{ kPa}$$

$$V = 43.3 \text{ Liters}$$

$$T = 87^\circ\text{C} = 360 \text{ K}$$

find n

$$n = \frac{P \times V}{R \times T} = \frac{153 \times 43.3}{8.314 \times 360}$$

$$n = 2.2134 \text{ moles}$$

3. If 8.2 moles of oxygen gas in a container have a volume of 35 Liters and a temperature of 40.3°C , What is the pressure inside the container in atmospheres?

$$n = 8.2 \text{ moles}$$

$$V = 35 \text{ L}$$

$$T = (40.3 + 273) = 313.3 \text{ K}$$

find P

$$P = \frac{n \times R \times T}{V} = \frac{8.2 \times 0.0821 \times 313.3}{35}$$

$$P = 6.0263 \text{ atm}$$

4. A container holds 17.7g of CO_2 gas at a pressure of 0.090 atm and a temperature of 56°C . What is the volume of the container?

$$m = 17.7 \text{ g of } \text{CO}_2 \quad P = 0.090 \text{ atm}$$

$$T = (56 + 273) = 329 \text{ K}$$

find V

$$\begin{array}{ccc} 1 \text{ mol of } \text{CO}_2 & \xrightarrow{\quad} & 44.01 \text{ g} \\ ? & \xrightarrow{\quad} & 17.7 \text{ g} \end{array}$$

$$= \frac{17.7 \times 1}{44.01}$$

$$= 0.4022$$

$$V = \frac{n \times R \times T}{P}$$

$$= \frac{0.4022 \times 0.0821 \times 329}{0.090}$$

$$= 120.71 \text{ L}$$

Chapter 15, 16: Solutions: Solve the following Molarity Problems

$$\text{Molarity} = \frac{\text{Moles of solute}}{\text{Liters of solution}}$$

1. What is the molarity of a solution that contains 8.7 moles of Lithium nitrate in 13.6 liters of solution?

8.7 moles of Lithium Nitrate in 13.6 L of solution

$$M = \frac{\text{Moles of solute}}{\text{Liters of solution}}$$

$$= \frac{8.7}{13.6}$$

$$= 0.6397 \text{ mole/L}$$

2. A flask contains 19.7 g $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (Sucrose) in 190.0 mL of solution. What is the molarity?

19.7 g of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ in 190.0 mL of solution

$$\begin{array}{ccc} 1 \text{ mole of } \text{C}_{12}\text{H}_{22}\text{O}_{11} & \xrightarrow{\quad} & 342.3 \text{ g} \\ ? & \xrightarrow{\quad} & 19.7 \text{ g} \end{array}$$

$$= \frac{19.7 \times 1}{342.3}$$

$$= 0.0576 \text{ moles}$$

$$M = \frac{\text{Moles of solute}}{\text{Liters of solution}}$$

$$\text{Liters of solution} = (190 \times 0.001)$$

$$= 0.19 \text{ L}$$

$$M = \frac{0.0576}{0.19} = 0.3032 \text{ mol/L}$$

3. What Mass of Li_3PO_4 would you need to make 2.5 Liters of a 3.5M Li_3PO_4 solution?

$$\begin{aligned}\text{Molarity} &= 3.5 \text{ M} \\ \text{number of moles of solution} &= M \times \text{Liters of solution} \\ &= 3.5 \times 2.5 \\ &= 8.75 \text{ moles}\end{aligned}$$

$$\begin{array}{lcl} 1 \text{ mole} & \longrightarrow & 115.79 \text{ g} \\ 8.75 \text{ moles} & \longrightarrow & ? \end{array}$$

$$= \frac{8.75 \times 115.79}{1}$$

$$= 1013.1625 \text{ g}$$

4. If you dissolved 299g of NaCl in water to make a 3.5M solution, what volume of solution is present?

$$\begin{array}{lcl} 1 \text{ mole} & \longrightarrow & 58.4 \text{ g} \\ ? & \longrightarrow & 299 \text{ g} \end{array}$$

$$= \frac{299 \times 1}{58.4}$$

$$= 5.1164 \text{ moles}$$

$$\text{Liters of solution} = \frac{\text{moles of solute}}{\text{Molarity}}$$

$$= \frac{5.1164}{3.5}$$

$$= 1.4618 \text{ L}$$