

Mole Calculations

Name - \_\_\_\_\_

1.) Calculate the mass of the following.

a.) 1.00 mol of  $\text{NH}_4\text{Cl}$ 

$$\text{Answer} - 1.00 \text{ mol} \times \frac{53.5 \text{ g}}{1 \text{ mol}} = 53.5 \text{ g}$$

b.) 4.50 mol of  $\text{NH}_4\text{Cl}$ 

$$\text{Answer} - 4.50 \text{ mol} \times \frac{53.5 \text{ g}}{1 \text{ mol}} = 241 \text{ g}$$

c.) 3.25 mol of  $\text{PCl}_3$ 

$$\text{Answer} - 3.25 \text{ mol} \times \frac{137.32 \text{ g}}{1 \text{ mol}} = 446 \text{ g}$$

d.) 0.00355 mol of  $\text{Na}_2\text{HPO}_4$ 

$$\text{Answer} - 0.00355 \text{ mol} \times \frac{141.96 \text{ g}}{1 \text{ mol}} = 0.504 \text{ g}$$

e.) 0.0125 mol of  $\text{XeF}_4$ 

$$\text{Answer} - 0.0125 \text{ mol} \times \frac{207.29 \text{ g}}{1 \text{ mol}} = 2.59 \text{ g}$$

f.) 2.60 mol of  $\text{CH}_3\text{CH}_3$ 

$$\text{Answer} - 2.60 \text{ mol} \times \frac{30.08 \text{ g}}{1 \text{ mol}} = 78.2 \text{ g}$$

g.)  $3.25 \times 10^2$  mol of  $\text{NH}_3$ 

$$\text{Answer} - 3.25 \times 10^2 \text{ mol} \times \frac{17.04 \text{ g}}{1 \text{ mol}} = 5540 \text{ g}$$

h.)  $7.90 \times 10^{-4}$  mol of  $\text{H}_2\text{SO}_3$ 

$$\text{Answer} - 7.90 \times 10^{-4} \text{ mol} \times \frac{82.08 \text{ g}}{1 \text{ mol}} = 0.0648 \text{ g}$$

i.)  $1.00 \times 10^{-3}$  mol of  $\text{NaOH}$ 

$$\text{Answer} - 1.00 \times 10^{-3} \text{ mol} \times \frac{40.00 \text{ g}}{1 \text{ mol}} = 0.0400 \text{ g}$$

j.)  $1.75 \times 10^{-4}$  mol of  $\text{Fe}$ 

$$\text{Answer} - 1.75 \times 10^{-4} \text{ mol} \times \frac{55.85 \text{ g}}{1 \text{ mol}} = 0.00977 \text{ g}$$

2.) Calculate the number of moles in the following.

a.) 17.0 g of  $\text{H}_2\text{SO}_4$ 

$$\text{Answer} - 17.0 \text{ g} \times \frac{1 \text{ mol}}{98.08 \text{ g}} = 0.173 \text{ mol}$$

b.) 91.5 g of  $\text{H}_2\text{O}$ 

$$\text{Answer} - 91.5 \text{ g} \times \frac{1 \text{ mol}}{18.02 \text{ g}} = 5.08 \text{ mol}$$

c.) 53.0 g of  $\text{C}$ 

$$\text{Answer} - 53.0 \text{ g} \times \frac{1 \text{ mol}}{12.01 \text{ g}} = 4.41 \text{ mol}$$

d.) 0.125 mg of  $\text{CuS}$  Answer -  $0.125 \text{ mg} \times$ 

$$\frac{1 \text{ g}}{1000 \text{ mg}} \times \frac{1 \text{ mol}}{95.61 \text{ g}} = 1.31 \times 10^{-6} \text{ mol}$$

e.) 4.50 kg of  $\text{CH}_4$ 

$$\text{Answer} - 4500 \text{ g} \times \frac{1 \text{ mol}}{16.05 \text{ g}} = 280 \text{ mol}$$

f.) 225 g of  $(\text{NH}_4)_2\text{SO}_4$ 

$$\text{Answer} - 225 \text{ g} \times \frac{1 \text{ mol}}{132.16 \text{ g}} = 1.70 \text{ mol}$$

g.) 55.2 mg of  $\text{Cl}_2$ 

$$\text{Answer} - 0.0552 \text{ g} \times \frac{1 \text{ mol}}{70.90 \text{ g}} = 7.79 \times 10^{-4} \text{ mol}$$

h.) 128.2 g of  $\text{SO}_2$ 

$$\text{Answer} - 128.2 \text{ g} \times \frac{1 \text{ mol}}{64.06 \text{ g}} = 2.001 \text{ mol}$$

i.) 2955 kg of Ag

j.) 0.0845 g of  $\text{KMnO}_4$ 

$$\text{Answer} - 2955 \text{ kg} \times \frac{1 \text{ mol}}{107.87 \text{ g}} = 2.739 \times 10^4 \text{ mol}$$

$$\text{Answer} - 0.0845 \text{ g} \times \frac{1 \text{ mol}}{158.04 \text{ g}} = 5.35 \times 10^{-4} \text{ mol}$$

3.) Calculate the molar mass of each of the substances mentioned in the following.

a.) A 0.250 mol sample of methane ( $\text{CH}_4$ ) has a mass of 4.00 g.

$$\text{Answer} - \frac{4.00 \text{ g}}{0.250 \text{ mol}} = \frac{16.0 \text{ g}}{1 \text{ mol}}$$

b.) A 0.00248 mol sample of cholesterol has a mass of 0.947 g.

$$\text{Answer} - \frac{0.947 \text{ g}}{0.00248 \text{ mol}} = \frac{382 \text{ g}}{1 \text{ mol}}$$

c.) The mass of  $6.47 \times 10^{-4}$  mol of diamond is 7.76 mg.

$$\text{Answer} - \frac{0.00776 \text{ g}}{6.47 \times 10^{-4} \text{ mol}} = \frac{12.0 \text{ g}}{1 \text{ mol}}$$

d.) A  $3.44 \times 10^{-5}$  mol sample of a particular protein has a mass of 74.8 g.

$$\text{Answer} - \frac{74.8 \text{ g}}{3.44 \times 10^{-5} \text{ mol}} = \frac{2.17 \times 10^6 \text{ g}}{1 \text{ mol}}$$

4.) Calculate the volume at STP (standard temperature and pressure) occupied by the following.

a.) 12.5 mol of  $\text{NH}_3$  (g)

$$\text{Answer} - 12.5 \text{ mol} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 280 \text{ L}$$

b.) 0.350 mol of  $\text{O}_2$  (g)

$$\text{Answer} - 0.350 \text{ mol} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 7.84 \text{ L}$$

c.) 4.25 mol of HCl (g)

$$\text{Answer} - 4.25 \text{ mol} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 95.2 \text{ L}$$

5.) Calculate the number of moles of the following gases at STP.

a.) 85.9 L of  $\text{H}_2$  (g)b.) 375 mL of  $\text{SO}_3$  (g)

$$\text{Answer} - 85.9 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 3.83 \text{ mol}$$

$$\text{Answer} - 0.375 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 0.0167 \text{ mol}$$

c.) 5.00 mL of  $\text{OCl}_2$  (g)

$$\text{Answer} - 0.00500 \text{ L} \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 2.23 \times 10^{-4} \text{ mol}$$