

Name Key Date \_\_\_\_\_ Hour \_\_\_\_\_

**More, MORE Mole Practice**

Sig Fig Practice:

Round the following numbers to three sig figs:

- a. 4.506 g 4.51 g      b. 124901 mL 125 000 mL      c. 0.03702 L 0.0370 L

Round the following numbers to four sig figs:

- a. 1077.9 kg 1078 kg      b. 0.00359087 cm 0.003591 cm      c. 10 g 10.00 g

1. How many moles of magnesium is  $3.01 \times 10^{22}$  atoms of magnesium?

$$\frac{3.01 \times 10^{22} \text{ atoms Mg}}{6.02 \times 10^{23} \text{ atoms Mg}} \times \frac{1 \text{ mol Mg}}{1 \text{ mol Mg}} = \boxed{0.0500 \text{ mol Mg}}$$

2. How many molecules are there in 4.00 moles of glucose,  $C_6H_{12}O_6$ ?

$$\frac{4.00 \text{ mol } C_6H_{12}O_6}{1 \text{ mol } C_6H_{12}O_6} \times \frac{6.02 \times 10^{23} \text{ molecules } C_6H_{12}O_6}{1 \text{ mol } C_6H_{12}O_6} = 2.408 \times 10^{24}$$

$$\boxed{2.41 \times 10^{24} \text{ molecules } C_6H_{12}O_6}$$

3. How many moles are  $1.20 \times 10^{25}$  atoms of phosphorous?

$$\frac{1.20 \times 10^{25} \text{ atoms P}}{6.02 \times 10^{23} \text{ atoms P}} \times \frac{1 \text{ mol P}}{1 \text{ mol P}} = \boxed{19.9 \text{ mol P}}$$

4. How many atoms are in 0.750 moles of zinc?

$$\frac{0.750 \text{ mol Zn}}{1 \text{ mol Zn}} \times \frac{6.02 \times 10^{23} \text{ atoms Zn}}{1 \text{ mol Zn}} = 4.515 \times 10^{23}$$

$$\boxed{4.52 \times 10^{23} \text{ atoms Zn}}$$

5. How many molecules are in 0.400 moles of dinitrogen pentoxide?

$$\frac{0.400 \text{ mol } N_2O_5}{1 \text{ mol } N_2O_5} \times \frac{6.02 \times 10^{23} \text{ molecules } N_2O_5}{1 \text{ mol } N_2O_5} = 2.41 \times 10^{23} \text{ molecules } N_2O_5$$

$$\boxed{2.41 \times 10^{23} \text{ molecules } N_2O_5}$$

6. How many moles in 28.55 grams of  $CO_2$ ?

$$\frac{28.55 \text{ g } CO_2}{44.01 \text{ g } CO_2} \times \frac{1 \text{ mol } CO_2}{1 \text{ mol } CO_2} = 0.6487 \text{ mol } CO_2$$

$$\boxed{0.6487 \text{ mol } CO_2}$$

$$\begin{array}{r} C | 1 \times 12.01 = 12.01 \\ O | 2 \times 16.00 = 32.00 \\ \hline 44.01 \end{array}$$

7. What is the mass of 5.00 moles of iron (II) oxide?  $Fe^{+2} O^{-2} \rightarrow Fe_2O$

$$\frac{5.00 \text{ mol } Fe_2O}{1 \text{ mol } Fe_2O} \times \frac{127.70 \text{ g } Fe_2O}{1 \text{ mol } Fe_2O} = 638.50$$

$$\boxed{639 \text{ g } Fe_2O}$$

$$\begin{array}{r} Fe | 2 \times 55.85 = 111.70 \\ O | 1 \times 16.00 = 16.00 \\ \hline 127.70 \end{array}$$

8. Find the number of moles of argon in 452 g of argon.

$$\frac{452 \text{ g Ar}}{39.95 \text{ g Ar}} \times \frac{1 \text{ mol Ar}}{1 \text{ mol Ar}} = 11.314 \rightarrow \boxed{11.3 \text{ mol Ar}}$$

9. Find the grams in  $1.26 \times 10^{-4}$  mol of  $\text{HC}_2\text{H}_3\text{O}_2$ .

$$\frac{1.26 \times 10^{-4} \text{ mol HC}_2\text{H}_3\text{O}_2}{1 \text{ mol HC}_2\text{H}_3\text{O}_2} \times 60.05 \text{ g HC}_2\text{H}_3\text{O}_2 = 0.007566$$

10. Find the mass in 2.6 mol of lithium bromide.

$$\frac{2.6 \text{ mol LiBr}}{1 \text{ mol LiBr}} \times 86.85 \text{ g LiBr} = 225.81 \text{ g LiBr}$$

$$\frac{0.00757 \text{ g HC}_2\text{H}_3\text{O}_2}{1 \text{ mol HC}_2\text{H}_3\text{O}_2}$$

$$\begin{array}{l} \text{H} | 4 \times 1.01 = 4.04 \\ \text{C} | 2 \times 12.01 = 24.02 \\ \text{O} | 2 \times 16.00 = 32.00 \end{array}$$

11. Determine the volume, in liters, occupied by 0.030 moles of a gas at STP.

$$\frac{0.030 \text{ mol}}{1 \text{ mol}} \times 22.4 \text{ L} = 0.672 \rightarrow 0.67 \text{ L gas}$$

12. How many moles of argon atoms are present in 11.2 L of argon gas at STP?

$$\frac{11.2 \text{ L Ar}}{22.4 \text{ L Ar}} \times 1 \text{ mol Ar} = 0.500 \text{ mol Ar}$$

13. What is the volume of 0.05 mol of neon gas at STP?

$$\frac{0.05 \text{ mol Ne}}{1 \text{ mol Ne}} \times 22.4 \text{ L Ne} = 1.12 \text{ L Ne}$$

14. How many moles is of 1.2 liters of water vapor at STP?

$$\frac{1.2 \text{ L H}_2\text{O}}{22.4 \text{ L H}_2\text{O}} \times 1 \text{ mol H}_2\text{O} = 0.05357 \text{ mol H}_2\text{O}$$

15. How many oxygen molecules are in 3.36 L of oxygen gas at STP?

$$\frac{3.36 \text{ L O}_2}{22.4 \text{ L O}_2} \times \frac{1 \text{ mol O}_2}{1 \text{ mol O}_2} \times 6.02 \times 10^{23} \text{ molecules O}_2 = 9.03 \times 10^{22} \text{ molecules O}_2$$

16. Find the mass in grams of  $2.00 \times 10^{23}$  molecules of fluorine gas.

$$\frac{2.00 \times 10^{23} \text{ molecules F}_2}{6.02 \times 10^{23} \text{ molecules F}_2} \times \frac{1 \text{ mol F}_2}{1 \text{ mol F}_2} \times 38.00 \text{ g F}_2 = 12.46 \text{ g F}_2$$

17. Determine the volume in liters occupied by 14.70 g of nitrogen gas at STP.

$$\frac{14.70 \text{ g N}_2}{28.02 \text{ g N}_2} \times \frac{1 \text{ mol N}_2}{1 \text{ mol N}_2} \times 22.4 \text{ L N}_2 = 11.75 \text{ L N}_2$$

18. Find the mass, in grams, of  $1.00 \times 10^{23}$  molecules of nitrogen gas.

$$\frac{1.00 \times 10^{23} \text{ molecules N}_2}{6.02 \times 10^{23} \text{ molecules N}_2} \times \frac{1 \text{ mol N}_2}{1 \text{ mol N}_2} \times 28.02 \text{ g N}_2 = 4.65 \text{ g N}_2$$

9. Determine the volume, in liters, occupied by 0.030 moles of a gas at STP.
10. How many moles of argon atoms are present in 11.2 L of argon gas at STP?
11. What is the volume of 0.05 mol of neon gas at STP?
12. How many moles is of 1.2 liters of water vapor at STP?
13. How many oxygen molecules are in 3.36 L of oxygen gas at STP?
14. Find the mass in grams of  $2.00 \times 10^{23}$  molecules of fluorine gas.
15. Determine the volume in liters occupied by 14.70 g of nitrogen gas at STP.
16. Find the mass, in grams, of  $1.00 \times 10^{23}$  molecules of nitrogen gas.
17. Find the percent composition of nitrogen in  $N_2I_6$ .
- $$\begin{array}{l}
 \text{N} \mid 2 \times 14.01 = 28.02 \\
 \text{I} \mid 6 \times 126.90 = \frac{761.4}{789.42}
 \end{array}
 \quad
 \begin{array}{l}
 \text{\% comp} \\
 \text{\% N} = \frac{28.02}{789.42} \times 100 = \boxed{3.55\%}
 \end{array}$$
18. A 12.4 g sample of lithium bromide is found to contain 4.5 g of lithium by mass. Calculate the percent of the sample that is bromide.
- $$12.4 \text{ g} - 4.5 \text{ g} = 7.9 \text{ g Br} \quad \text{\% Br} = \frac{7.9}{12.4} \times 100 = 63.7 \quad \boxed{64\%}$$