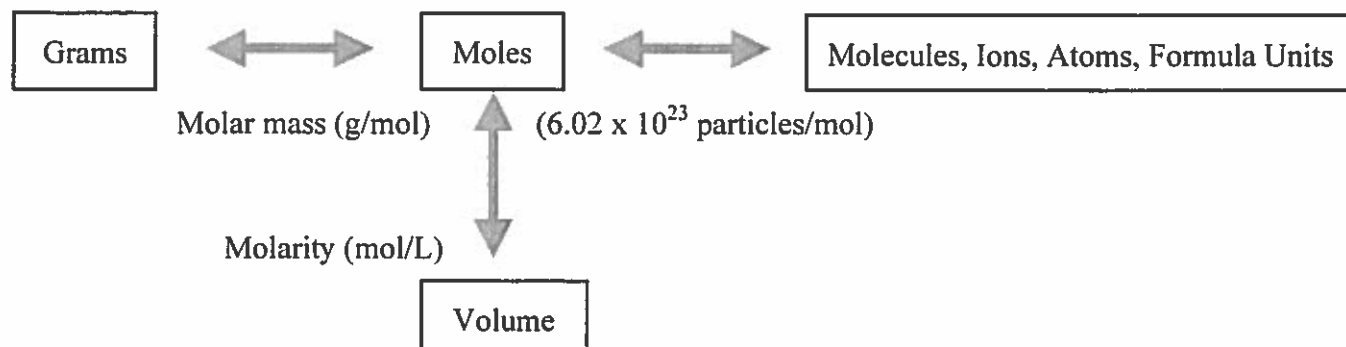


Give Fri → due Monday before test

Chemistry: Ch 10 Practice Test

Name Key
Per _____ Date _____

Solve the following problems in the space provided. Show your work to receive full credit.



- 1) How many moles are in 3.67×10^{24} atoms of silver (Ag)?

$$\frac{3.67 \times 10^{24} \text{ atoms Ag}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{1 \text{ mol Ag}}{1 \text{ mol Ag}} = \boxed{6.10 \text{ mol Ag}}$$

- 2) Find the molarity of a 633 mL solution containing 17.5 g of MgSO_4 .

$$\frac{17.5 \text{ g MgSO}_4}{137.87 \text{ g}} \times \frac{1 \text{ mol MgSO}_4}{1 \text{ mol MgSO}_4} = .127 \text{ mol MgSO}_4$$

$$633 \text{ mL} = .633 \text{ L}$$

$$M = \frac{\text{mol}}{\text{L}} \Rightarrow \frac{.127 \text{ mol}}{.633 \text{ L}} = \boxed{.200 \text{ M MgSO}_4}$$

- 3) How many grams of CuCl_2 are required to make 96 mL of a 0.30M solution?

$$96 \text{ mL} \rightarrow .096 \text{ L}$$

$$\frac{.096 \text{ L} \times .3 \text{ mol}}{1 \text{ L}} \times \frac{134.45 \text{ g}}{1 \text{ mol CuCl}_2} = \boxed{3.9 \text{ g CuCl}_2}$$

- 4) How many water molecules are in 127.3 grams of water (H_2O)?

$$\frac{127.3 \text{ g H}_2\text{O}}{18.02 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol H}_2\text{O}} \times \frac{6.02 \times 10^{23} \text{ molec}}{1 \text{ mol H}_2\text{O}} = \boxed{4.253 \times 10^{24} \text{ molec H}_2\text{O}}$$

5) Calculate the percentage composition of nitric acid (HNO₃).

$$\begin{array}{r} 1.01 \\ 14.01 \\ + 3(16) \\ \hline 63.02 \text{ g/mol} \end{array}$$

$$\% \text{ H} : \frac{1.01}{63.02} \times 100 = 1.6\% \text{ H}$$

$$\% \text{ N} : \frac{14.01}{63.02} \times 100 = 22.2\% \text{ N}$$

$$\% \text{ O} : \frac{3(16)}{63.02} \times 100 = 76.2\% \text{ O}$$

Check:

$$\begin{array}{r} 1.6 \\ 22.2 \\ + 76.2 \\ \hline 100\% \end{array}$$

6) Calculate the mass percentage of water in CoCl₂ • 6 H₂O.

$$\begin{array}{r} 58.93 \\ 2(35.45) \\ + 6(18.02) \\ \hline 237.95 \text{ g/mol} \end{array}$$

$$\% \text{ H}_2\text{O} : \frac{6(18.02)}{237.95} \times 100 = 45.4\% \text{ H}_2\text{O}$$

7) Answer both parts of question 7.

a. A compound is composed of 54.05% Ca, 43.24% O, 2.71% H. Find the empirical formula.

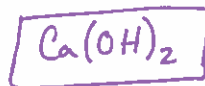
$$\frac{54.05 \text{ g Ca}}{40.08 \text{ g}} \left| \frac{1 \text{ mol Ca}}{40.08 \text{ g}} \right. = \frac{1.35 \text{ mol Ca}}{1.35 \text{ mol}} \sim 1 \text{ Ca}$$

$$\frac{43.24 \text{ g O}}{16 \text{ g}} \left| \frac{1 \text{ mol O}}{16 \text{ g}} \right. = \frac{2.70 \text{ mol O}}{1.35 \text{ mol}} \sim 2 \text{ O}$$

$$\frac{2.71 \text{ g H}}{1.01 \text{ g}} \left| \frac{1 \text{ mol H}}{1.01 \text{ g}} \right. = \frac{2.68 \text{ mol H}}{1.35 \text{ mol}} \sim 2 \text{ H}$$



↓



b. If the substance from Part (a) has a molecular formula mass of 222 g/mol, find its molecular formula.

$$\text{Emp. Form. mass} : \begin{array}{r} 40.08 \\ 2(16) \\ 2(1.01) \\ \hline 74.1 \text{ g/mol} \end{array}$$

$$\frac{\text{mass}_{\text{molec}}}{\text{mass}_{\text{emp}}} = \frac{222 \text{ g/mol}}{74.1 \text{ g/mol}} = 3$$

