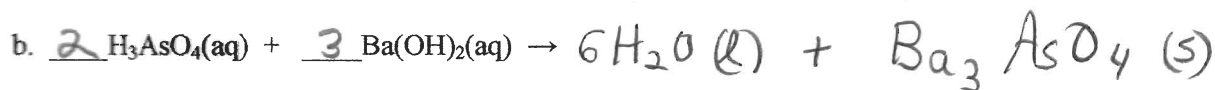


SHOW ALL WORK TO RECEIVE CREDIT.

Molar Masses you may need: H 1.01; C 12.01; N 14.01; O 16.00; S 32.07; Co 58.93; Cu 63.55

1. (4 Pts) Complete and balance each of the following reactions:



2. (4 Pts) Determine the molar mass of each of the following:

a. $\text{Co}(\text{NO}_3)_2$

$$\begin{array}{r} 6 \times 16.00 = 96.00 \\ 2 \times 14.01 \\ 1 \times 58.93 \\ \hline 182.95 \end{array}$$

b. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

$$\begin{array}{r} 9 \times 16.00 = 96.00 \\ 10 \times 1.01 = 10.1 \\ 1 \times 32.07 = 32.07 \\ 1 \times 63.55 = 63.55 \\ \hline 249.72 \end{array}$$

3. (2 Pts) Calculate the percent oxygen in $\text{Co}(\text{NO}_3)_2$.

$$\frac{96.00}{182.95} \times 100 = 52.47\%$$

4. Analysis of a compound gave the following percentages:

C 26.7%

H 2.2%

O 71.1%

a. (4 Pts) Determine the compound's empirical formula.

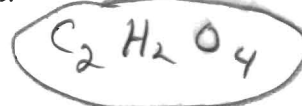
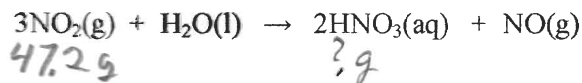
Assume 100g so 100% = 100g

$$\begin{array}{l} \text{C: } \frac{26.7\text{g}}{12.01\text{g/mol}} = 2.22 \div 2.22 = 1 \\ \text{H: } \frac{2.2\text{g}}{1.01\text{g/mol}} = 2.18 \div 2.18 = 1 \\ \text{O: } \frac{71.1\text{g}}{16.00\text{g/mol}} = 4.44 \div 4.44 = 2 \end{array}$$



b. (2 Pts) Its molar mass was found to be 90 g/mole. What is the molecular formula?

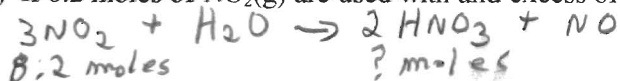
$$\text{molar } \text{CH}_2\text{O}_2 \approx 45; \text{ so } 90 \div 45 = 2; \text{ so}$$

5a. (6 Pts) The Ostwald process can be used to manufacture nitric acid, HNO_3 . Given the following equation, determine how many grams of nitric acid can be produced from 47.2 grams of nitrogen dioxide.

47.2g

?g

$$\frac{47.2\text{g NO}_2}{46.01\text{g NO}_2} \times \frac{2\text{mol HNO}_3}{3\text{mol NO}_2} \times \frac{63.02\text{g HNO}_3}{1\text{mol HNO}_3} = 43.1\text{g HNO}_3$$

b. (3 Pts) If 8.2 moles of $\text{NO}_2(\text{g})$ are used with an excess of water, how many moles of nitric acid can be formed?

8.2 moles

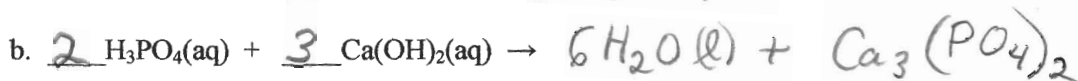
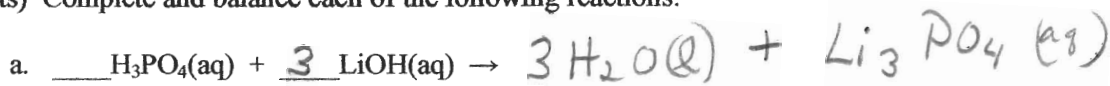
? moles

$$8.2\text{mol NO}_2 \times \frac{2\text{mol HNO}_3}{3\text{mol NO}_2} = 5.5\text{mol HNO}_3$$

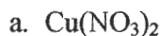
SHOW ALL WORK TO RECEIVE CREDIT.

Molar Masses you may need: H 1.01; C 12.01; N 14.01; O 16.00; S 32.07; Co 58.93; Cu 63.55

1. (4 Pts) Complete and balance each of the following reactions:



2. (4 Pts) Determine the molar mass of each of the following:



$$\begin{array}{r} 1 \times 63.55 \\ 2 \times 14.01 \\ 6 \times 16.00 \\ \hline 187.57 \end{array}$$



$$\begin{array}{r} 1 \times 58.93 \\ 1 \times 32.07 \\ 10 \times 1.01 \\ 9 \times 16.00 \\ \hline 245.1 \end{array}$$

3. (2 Pts) Calculate the percent oxygen in $\text{Cu}(\text{NO}_3)_2$.

$$\frac{96.00}{187.57} \times 100 = 51.18\%$$

4. Analysis of a compound gave the following percentages: C 26.7% H 2.2% O 71.1%

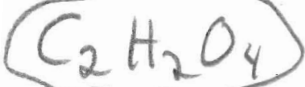
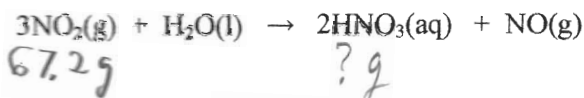
a. (4 Pts) Determine the compound's empirical formula

See Quiz 3a

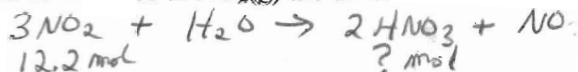


b. (2 Pts) Its molar mass was found to be 90 g/mole. What is the molecular formula?

See Quiz 3a

5a. (6 Pts) The Ostwald process can be used to manufacture nitric acid, HNO_3 . Given the following equation, determine how many grams of nitric acid can be produced from 67.2 grams of nitrogen dioxide.

$$\frac{67.2 \text{ g NO}_2}{46.01 \text{ g NO}_2} \times \frac{2 \text{ mol HNO}_3}{3 \text{ mol NO}_2} \times 63.02 \text{ g HNO}_3 = 61.4 \text{ g HNO}_3$$

b. (3 Pts) If 12.2 moles of $\text{NO}_2(\text{g})$ are used with and excess of water, how many moles of nitric acid can be formed?

$$\frac{12.2 \text{ mol NO}_2}{3 \text{ mol NO}_2} \times 2 \text{ mol HNO}_3 = 8.13 \text{ mol HNO}_3$$