

Information: mole = 6.02×10^{23} , molar masses: S = 32.06, Al = 27.0, N = 14.07, C = 12.01, H = 1.01, Si = 28.1, O = 16.00, P = 31.0, Xe = 131.3, F = 19.0, K = 39.1

SHOW ALL WORK FOR CREDIT.

1. (3) Determine the number of moles of aluminum in 96.7 g of Al.

$$\frac{96.7 \text{ g}}{27.0 \text{ g/mol}} = 3.58 \text{ mol Al}$$

2. (3) What is the molar mass of acetaminophen, $C_8H_9NO_2$?

$$\begin{array}{l} 2 \times 16.00 = 32.00 \\ 1 \times 14.07 = 14.07 \\ 9 \times 1.01 = 9.09 \\ 8 \times 12.01 = 96.08 \end{array} \quad \begin{array}{l} \\ \\ \\ \hline \end{array} \quad \begin{array}{l} \\ \\ \\ \hline 151.24 \end{array}$$

3. (4) How many sulfur atoms are there in 21.0 g of Al_2S_3 ?

21.0 g Al_2S_3	mol	3 S	6.02×10^{23} Atoms	<u>151.24</u>
	150.2	1 Al_2S_3	mol	

$$= 2.52 \times 10^{23} \text{ S Atoms}$$

4. (4) The empirical formula of a compound of uranium and fluorine that is composed of 67.6% uranium and 32.4% fluorine is

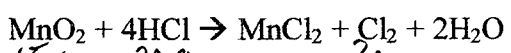
Assume 100g

$$U: \frac{67.6 \text{ g}}{238.0 \text{ g/mol}} = 0.285 \div 0.285 = 1$$

$$F: \frac{32.4 \text{ g}}{19.0 \text{ g/mol}} = 1.705 \div 0.285 = 6$$



5. (5) How many grams of Cl_2 can be prepared from the reaction of 15.0 g of MnO_2 and 30.0 g of HCl according to the following chemical equation?

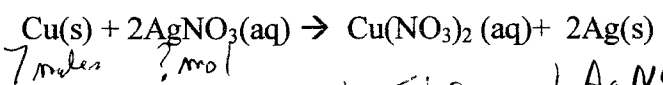


Based on MnO_2 : $\frac{15.0 \text{ g } MnO_2}{86.94 \text{ g/mol}} \times 1 \text{ mol } Cl_2 \times 70.9 \text{ g/mol} = 12.2 \text{ g } Cl_2$

Based on HCl: $\frac{30.0 \text{ g HCl}}{36.46 \text{ g/mol}} \times 1 \text{ mol } Cl_2 \times 70.9 \text{ g/mol} = 14.58 \text{ g } Cl_2$

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6. (3) How many moles of silver nitrate are necessary to react completely with 7 moles of copper?



$$\frac{7 \text{ mol Cu}}{1 \text{ mol Cu}} \times 2 \text{ mol } AgNO_3 = 14 \text{ mol } AgNO_3$$

7. (3) Calculate the percent oxygen by mass in Na_2CO_3 .

$$\begin{array}{l} 3 \times 16.00 = 48.00 \\ 1 \times 12.01 = 12.01 \\ 2 \times 23.00 = 46.00 \end{array} \quad \begin{array}{l} \\ \\ \\ \hline 106.01 \text{ g/mol} \end{array} \quad \frac{48.00}{106.01} \times 100 = 45.3\%$$