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Molar masses: C 12.01; N 14.01; O 16.00; Na 22.99; Al 26.98; S 32.06; Fe 55.85; I 126.9;

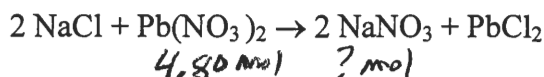
1. (3 Pts) Calculate the molar mass, in g/mol, of
- $\text{Al}_2(\text{SO}_4)_3$
- .

$$\begin{array}{l}
 12 \times 16.00 = 192.0 \\
 3 \times 32.06 = 96.18 \\
 2 \times 26.98 = 53.96 \\
 \hline
 342.14 \text{ g/mol}
 \end{array}$$

2. (3 Pts) How many moles of iron are present in an iron cylinder that weighs 25 g?

$$\frac{25 \text{ g}}{55.85 \text{ g/mol}} = 0.45 \text{ mol}$$

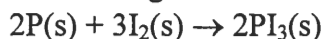
3. (5 Pts) How many moles of sodium nitrate would be produced from the complete reaction of 4.80 mol of lead nitrate?



4.80 mol ? mol

$$\frac{4.80 \text{ mol Pb}(\text{NO}_3)_2}{1 \text{ mol Pb}(\text{NO}_3)_2} \times \frac{2 \text{ mol NaNO}_3}{1 \text{ mol Pb}(\text{NO}_3)_2} = 9.60 \text{ mol NaNO}_3$$

4. (5 Pts) What is the theoretical yield of
- PI_3
- if 48.0 g of
- I_2
- are reacted with an excess of phosphorus according to the following chemical equation?

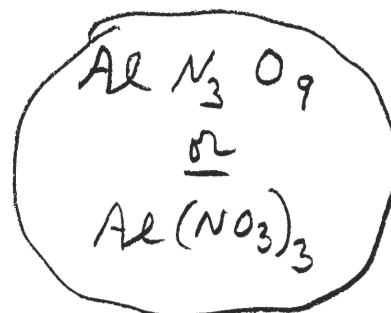


48.0 g ? g

$$\frac{48.0 \text{ g I}_2}{253.8 \text{ g I}_2} \times \frac{2 \text{ mol PI}_3}{3 \text{ mol I}_2} = 0.126 \text{ mol PI}_3 \text{ or } 51.9 \text{ g}$$

5. (5 Pts) A sample of unknown ore was analyzed and found to contain 12.7% Al, 19.7% N, and 67.6% O. What is the empirical formula of this ore?

$$\begin{array}{l}
 \text{Al: } \frac{12.7 \text{ g}}{26.98 \text{ g/mol}} = 0.471 \div 0.471 = 1 \\
 \text{N: } \frac{19.7 \text{ g}}{14.01 \text{ g/mol}} = 1.41 \div 0.471 = 3 \\
 \text{O: } \frac{67.6 \text{ g}}{16.00 \text{ g/mol}} = 4.23 \div 0.471 = 9
 \end{array}$$



6. (4 Pts) Calculate the percent composition by mass of sodium in
- Na_2CO_3
- .

molar mass = 105.99

$$\frac{2 \times 22.99}{105.99} \times 100 = 43.38 \% \text{ Na}$$