

Gravimetric Stoichiometry

Gravimetric - refers to mass measurement

Stoichiometric - refers to the procedure used to calculate quantities of chemicals.

GRAVIMETRIC STOICHIOMETRY - the procedure for calculating the masses of reactants and products in a chemical reaction.

ASSUMPTIONS IN STOICHIOMETRY

- the reaction is spontaneous.
- the reaction is fast
- the reaction is quantitative.
- the reaction is stoichiometric.

(there is a whole number ratio between MOLES of reactant and MOLES of product.)

Dilution Worksheet

Until 8:45

$$\textcircled{1} V_i = 40.0 \text{ mL}$$

$$C_i = 2.5 \text{ M}$$

$$V_f = 500. \text{ mL}$$

$$C_f = ?$$

$$V_i C_i = V_f C_f$$

$$(40.0 \text{ mL})(2.5 \text{ mol/L}) = (500. \text{ mL}) C_f$$

$$C_f = \frac{(40.0 \text{ mL})(2.5 \text{ mol/L})}{(500. \text{ mL})}$$

$$C_f = 0.20 \text{ M}$$

Gravimetric Stoichiometry

Iron can be produced by the reaction of iron (III) oxide, from iron ore, with carbon monoxide to produce iron metal and carbon dioxide. What **mass of iron (III) oxide** is required to produce **1000. g of iron?**



Step 1: # moles known

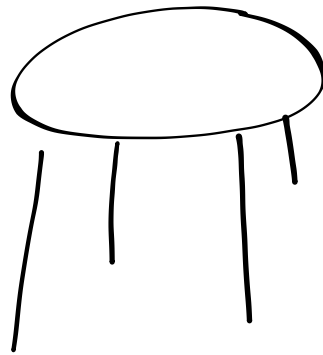
$$1000. \text{g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} = 17.905 \text{ mol Fe}$$

Step 2: moles unknown

$$17.905 \text{ mol Fe} \times \frac{1 \text{ mol Fe}_2\text{O}_3}{2 \text{ mol Fe}} = 8.953 \text{ mol Fe}_2\text{O}_3$$

Step 3: mass unknown

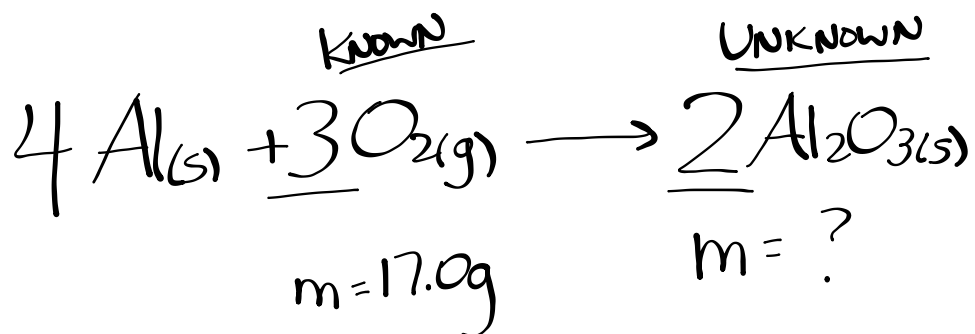
$$8.953 \text{ mol Fe}_2\text{O}_3 \times \frac{159.70 \text{ g Fe}_2\text{O}_3}{1 \text{ mol Fe}_2\text{O}_3} = 1430. \text{g Fe}_2\text{O}_3$$



Try This



What mass of aluminum oxide will be produced if 17.0 g of oxygen reacts with excess aluminum?



Step 1: Moles Known

$$17.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.00 \text{ g O}_2} = 0.53125 \text{ mol O}_2$$

Step 2: Moles Unknown

$$0.53125 \text{ mol O}_2 \times \frac{2 \text{ mol Al}_2\text{O}_3}{3 \text{ mol O}_2} = 0.354 \text{ mol Al}_2\text{O}_3$$

Step 3: Mass Unknown

$$0.354 \text{ mol Al}_2\text{O}_3 \times \frac{101.96 \text{ g Al}_2\text{O}_3}{1 \text{ mol Al}_2\text{O}_3} = \boxed{36.1 \text{ g Al}_2\text{O}_3}$$

Worksheet

