

Homework - Dilutions

⑤

$$V_i = ?$$

$$C_i = 6.00 M$$

$$V_f = 250. mL$$

$$C_f = 1.50 M$$

$$V_i C_i = V_f C_f$$

$$V_i (6.00 \text{ mol/L}) = (250. \text{ mL}) (1.50 \text{ mol/L})$$

$$V_i = \frac{(250. \text{ mL}) (1.50 \text{ mol/L})}{(6.00 \text{ mol/L})}$$

$$V_i = 62.5 \text{ mL}$$

⑨ $V_i = ?$

$$C_i = 15.0 M$$

$$V_f = 250. \text{ mL}$$

$$C_f = 6.00 M$$

$$V_i C_i = V_f C_f$$

$$V_i (15.0 \text{ mol/L}) = (250 \text{ mL}) (6.0 \text{ mol/L})$$

$$V_i = 100. \text{ mL}$$

Initial volume: 100. mL

+ 150. mL water

Final volume: 250 mL

$$1.0 \times 10^2 \text{ mL}$$

$$100. \text{ mL}$$

2 s.f.

Gravimetric Stoichiometry

Gravimetric - refers to mass measurement

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

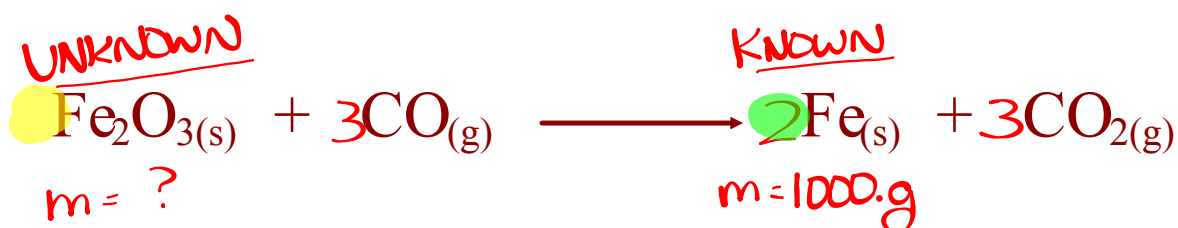
GRAVIMETRIC STOICHIOMETRY - the procedure for calculating the masses of reactants and products in a chemical reaction.

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.)

What mass of iron (III) oxide is required to produce 1000. g of iron according to the following reaction?



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

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

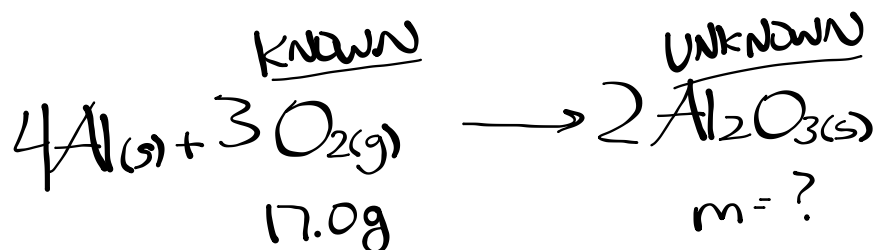
Step 3: mass unknown

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

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

$$0.53125\text{mol O}_2 \times \frac{2\text{mol Al}_2\text{O}_3}{3\text{mol O}_2} = 0.3542\text{mol Al}_2\text{O}_3$$

Step 3: Mass Unknown

$$0.3542\text{mol Al}_2\text{O}_3 \times \frac{101.96\text{g Al}_2\text{O}_3}{1\text{mol Al}_2\text{O}_3} = \boxed{36.1\text{g Al}_2\text{O}_3}$$

Worksheet

