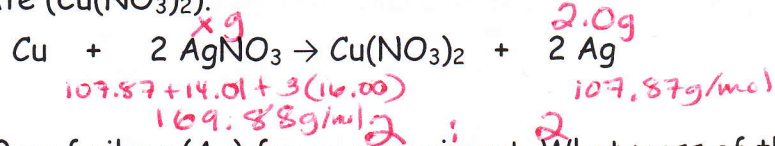


# Stoichiometry Practice #1

1. According to the equation below, adding copper (Cu) to silver nitrate ( $\text{AgNO}_3$ ) allows a chemical reaction to occur that produces silver (Ag) and copper nitrate ( $\text{Cu}(\text{NO}_3)_2$ ).



You need 2.0 g of silver (Ag) for an experiment. What mass of the silver nitrate will you require to obtain the 2.0 g of silver that you need?

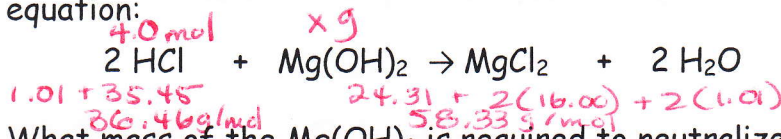
- ① balance
- ② given
- ③ molar mass
- ④ mole ratio

given

$$2.0g \text{ Ag} \times \frac{1 \text{ mol Ag}}{107.87g \text{ Ag}} \times \frac{2 \text{ mol AgNO}_3}{2 \text{ mol Ag}} \times \frac{169.88g \text{ AgNO}_3}{1 \text{ mol AgNO}_3} = \frac{679.520}{215.74} = 3.149g$$

↓  
3.1g

2. To neutralize hydrochloric acid (HCl), magnesium hydroxide ( $\text{Mg}(\text{OH})_2$ ), a base is added. The neutralization reaction is represented by the following equation:



What mass of the  $\text{Mg}(\text{OH})_2$  is required to neutralize 4.0 moles of HCl?

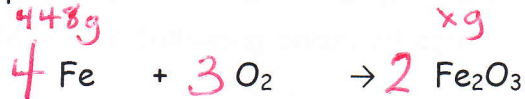
- ⑥ →
- ⑨
- mm
- mr

given

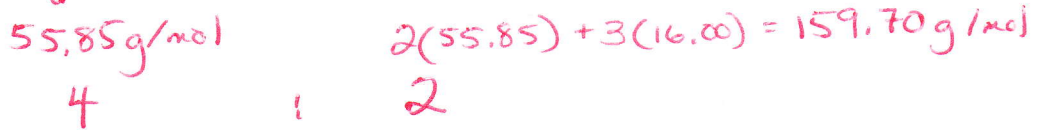
$$4.0 \text{ mol HCl} \times \frac{1 \text{ mol Mg}(\text{OH})_2}{2 \text{ mol HCl}} \times \frac{58.33g \text{ Mg}(\text{OH})_2}{1 \text{ mol Mg}(\text{OH})_2} = 116.66$$

↓  
120g  $\text{Mg}(\text{OH})_2$

3. The following equation describes the oxidation of iron.



How much  $\text{Fe}_2\text{O}_3$  is formed by the complete oxidation of 448 g of iron?

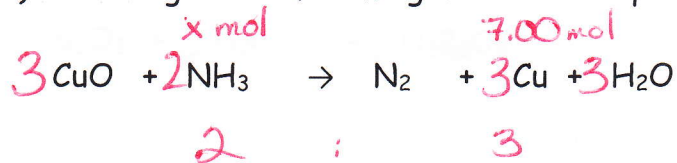


given!

$$448\text{g Fe} \times \frac{1\text{ mol Fe}}{55.85\text{g}} \times \frac{2\text{ mol Fe}_2\text{O}_3}{4\text{ mol Fe}} \times \frac{159.70\text{g Fe}_2\text{O}_3}{1\text{ mol Fe}_2\text{O}_3} = \frac{143091.200}{223.400}$$

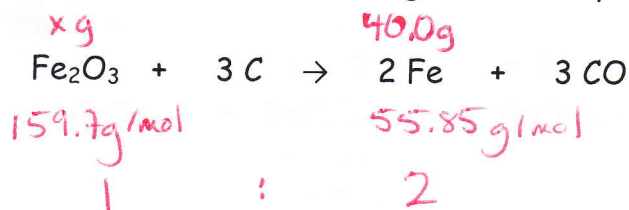
$$640.516 \rightarrow \boxed{641\text{g}}$$

4. How many moles of ammonia ( $\text{NH}_3$ ) are needed to obtain 7.00 moles of copper ( $\text{Cu}$ ) according to the following unbalanced equation?



$$7.00\text{ mol Cu} \times \frac{2\text{ mol NH}_3}{3\text{ mol Cu}} \rightarrow 4.666 \rightarrow \boxed{4.67\text{ mol NH}_3}$$

5. You would like to produce 40.0 g of iron (Fe), what mass of iron oxide ( $\text{Fe}_2\text{O}_3$ ) is needed? The following balanced equation represents the reaction.



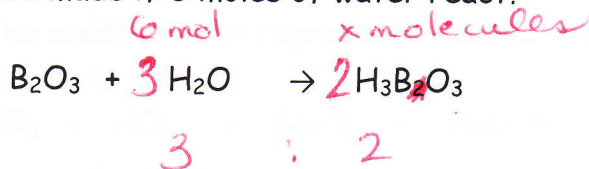
given

$$40.0\text{g Fe} \times \frac{1\text{mol Fe}}{55.85\text{g Fe}} \times \frac{1\text{mol Fe}_2\text{O}_3}{2\text{mol Fe}} \times \frac{159.7\text{g Fe}_2\text{O}_3}{1\text{mol Fe}_2\text{O}_3} = 57.1888$$

↓

57.2g  $\text{Fe}_2\text{O}_3$

6. According to the following unbalanced equation, how many molecules of the product will be made if 6 moles of water react?



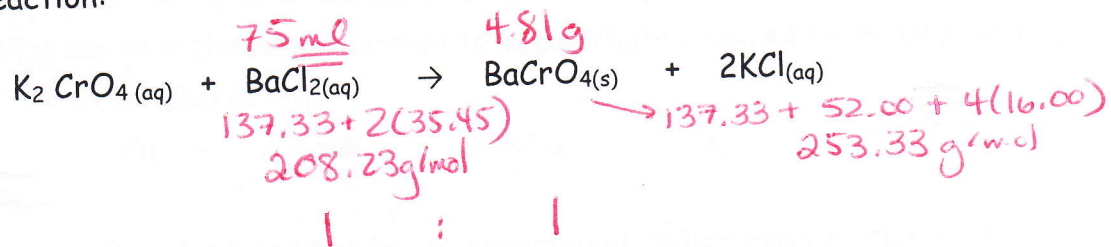
$$6\text{ mol H}_2\text{O} \times \frac{2\text{ mol H}_3\text{BO}_3}{3\text{ mol H}_2\text{O}} \times \frac{6.023 \times 10^{23}\text{ molecules H}_3\text{BO}_3}{1\text{ mol H}_3\text{BO}_3}$$

$$2.408 \times 10^{24}$$

↓

$2 \times 10^{24}$  molecules  $\text{H}_3\text{BO}_3$

7. 75 mL of  $\text{BaCl}_2$  is used to produce  $\text{BaCrO}_4$ . If 4.81 g of  $\text{BaCrO}_4$  is made, what is the concentration of the  $\text{BaCl}_2$  used? The following equation represents the reaction:

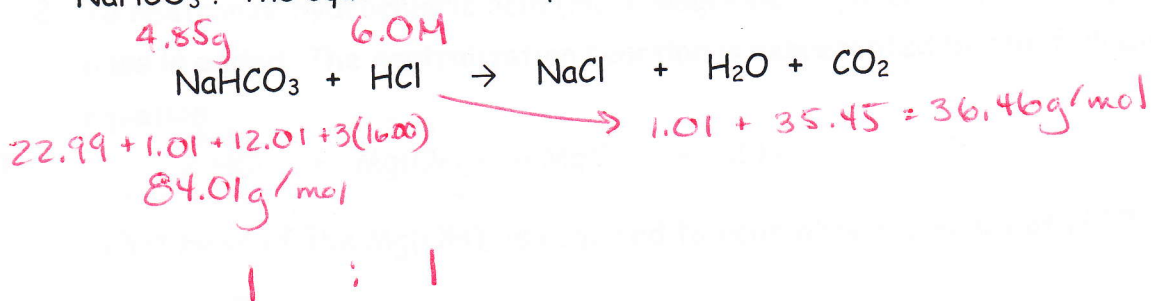


① given

$$4.81 \text{ g BaCrO}_4 \times \frac{1 \text{ mol BaCrO}_4}{253.33 \text{ g/mol}} \times \frac{1 \text{ mol BaCl}_2}{1 \text{ mol BaCrO}_4} = 0.018987 \text{ mol}$$

$$\textcircled{2} \quad \frac{0.018987 \text{ mol}}{75 \text{ ml}} : \frac{x \text{ mol}}{1000 \text{ ml}} = 0.25316 \rightarrow \boxed{0.25 \text{ mol/L}}$$

8. How many mL of a 6.0M solution of HCl are needed to react with 4.85g of  $\text{NaHCO}_3$ ? The equation that represents the reaction follows.



① given

$$4.85 \text{ g NaHCO}_3 \times \frac{1 \text{ mol NaHCO}_3}{84.01 \text{ g NaHCO}_3} \times \frac{1 \text{ mol HCl}}{1 \text{ mol NaHCO}_3} \rightarrow 0.0577 \text{ mol}$$

$$\textcircled{2} \quad \frac{0.0577 \text{ mol}}{x \text{ ml}} : \frac{6 \text{ mol}}{1000 \text{ ml}} \rightarrow 9.61666 \rightarrow \boxed{9.6 \text{ ml}}$$