

Ch.3 Stoichiometry Practice

Name: CALVIN

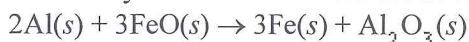
Date:

Hour:

- 1) In the reaction  $2\text{CO}(g) + \text{O}_2(g) \rightarrow 2\text{CO}_2(g)$ , what is the ratio of moles of oxygen used to moles of  $\text{CO}_2$  produced?

$$\boxed{1:2}$$

- 2) How many moles of aluminum are needed to react completely with 5.2 mol of  $\text{FeO}$ ?



x mol    5.2 mol

$$\frac{5.2 \text{ mol FeO} \times \frac{2 \text{ mol Al}}{3 \text{ mol FeO}}}{1} = \boxed{3.5 \text{ mol Al}}$$

- 3) Iron(III) oxide is formed when iron combines with oxygen in the air. How many grams of  $\text{Fe}_2\text{O}_3$  are formed when 26.7 g of Fe reacts completely with oxygen?



26.7 g

x g

$$\frac{26.7 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{4 \text{ mol Fe}} \times \frac{159.70 \text{ g Fe}_2\text{O}_3}{1 \text{ mol Fe}_2\text{O}_3}}{1} = \boxed{38.2 \text{ g Fe}_2\text{O}_3}$$

- 4) How many moles of  $\text{H}_3\text{PO}_4$  are produced when 21.0 g  $\text{P}_4\text{O}_{10}$  reacts completely to form  $\text{H}_3\text{PO}_4$ ?

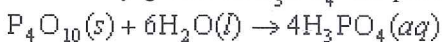


21.0 g

x mol

$$\frac{21.0 \text{ g P}_4\text{O}_{10} \times \frac{1 \text{ mol P}_4\text{O}_{10}}{283.88 \text{ g P}_4\text{O}_{10}} \times \frac{4 \text{ mol H}_3\text{PO}_4}{1 \text{ mol P}_4\text{O}_{10}}}{1} = \boxed{0.296 \text{ mol H}_3\text{PO}_4}$$

- 5) How many grams of  $\text{H}_3\text{PO}_4$  are produced when 30.0 moles of water react with an excess of  $\text{P}_4\text{O}_{10}$ ?

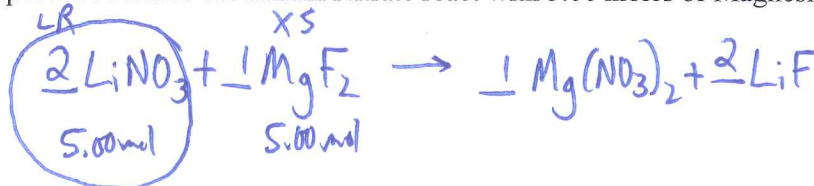


30.0 mol

x g

$$\frac{30.0 \text{ mol H}_2\text{O} \times \frac{4 \text{ mol H}_3\text{PO}_4}{6 \text{ mol H}_2\text{O}} \times \frac{98.00 \text{ g H}_3\text{PO}_4}{1 \text{ mol H}_3\text{PO}_4}}{1} = \boxed{1.96 \times 10^3 \text{ g H}_3\text{PO}_4}$$

- 6) Suppose 5.00 moles of Lithium Nitrate react with 5.00 moles of Magnesium Fluoride react. Find the limiting reactant.



Optimal

$$\frac{5.00 \text{ mol MgF}_2 \times \frac{2 \text{ mol LiF}}{1 \text{ mol MgF}_2}}{1} = 10.0 \text{ mol LiF}$$

$$\frac{5.00 \text{ mol LiNO}_3 \times \frac{2 \text{ mol LiF}}{2 \text{ mol LiNO}_3}}{1} = 5.00 \text{ mol LiF}$$

$\text{LiNO}_3$  is LR

- 7) Aluminum oxide decomposes when heated to produce Aluminum and Oxygen. What is the mole ratio of aluminum to oxygen?



4:3

- 8) For the reaction represented by the equation  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ , how many moles of nitrogen are required to produce 18 mol of ammonia?

$$\frac{18 \text{ mol NH}_3}{2 \text{ mol NH}_3} \times \frac{1 \text{ mol N}_2}{3 \text{ mol H}_2} = 9.5 \text{ mol N}_2$$

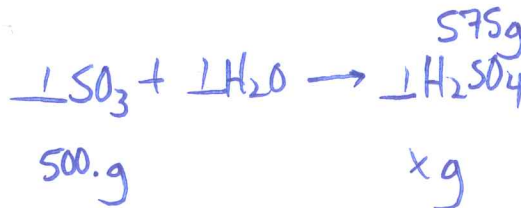
- 9) When the limiting reactant in a chemical reaction is completely used, the
- excess reactants begin combining.
  - reaction slows down.
  - reaction speeds up.
  - reaction stops.

- 10) To determine the limiting reactant in a chemical reaction, one must know the
- available amount of one of the reactants.
  - amount of product formed.
  - available amount of each reactant.
  - speed of the reaction.

- 11) What is the maximum possible amount of product obtained in a chemical reaction?

theoretical yield

- 12) For the reaction represented by the equation  $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$ , calculate the percentage yield if 500. g of sulfur trioxide react with excess water to produce 575 g of sulfuric acid.



$$\frac{500. \text{g SO}_3}{80.06 \text{ g SO}_3} \times \frac{1 \text{ mol SO}_3}{1 \text{ mol SO}_3} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol SO}_3} \times \frac{98.08 \text{ g H}_2\text{SO}_4}{1 \text{ mol H}_2\text{SO}_4} = 613 \text{ g}$$

GO VIKINGS!!

$$\frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{575 \text{g}}{613 \text{g}} \times 100 = 93.8\%$$