2024 University Unit 7 Test Part 1

- 1. Mitchell and his lab partner were conducting a titration experiment that involved sodium hydroxide and sulfuric acid. When mixed together they produce sodium sulfate and water. Their goal was to neutralize 0.50 mol sodium hydroxide. How many moles of sulfuric acid are needed to complete the neutralization?
- 2. For the reaction represented by the equation below, how many grams of potassium chloride can be produced from 300. g of potassium bromide?

$$\text{Cl}_2 \textbf{+} \text{KBr} \rightarrow \text{Br}_2 \textbf{+} \text{KCl}$$

3. How many grams of O2 are required to produce 358.5 grams of ZnO?

$$Zn + O_2 \rightarrow ZnO$$

4. How many moles of oxygen are produced when 3.0 mol of KCIO3 decompose completely?

$$\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$$

- 5. What is the maximum possible amount of product obtained in a chemical reaction?
 - a. theoretical yield
 - b. Percent yield
 - c. Mole ratio
 - d. Actual yield
- 6. For the reaction below, calculate the percent yield if 500. g of sulfur trioxide reacts with excess water to produce 575 g (actual yield) of sulfuric acid.

$SO_3 + H_2O \rightarrow H_2SO_4$

7. For the reaction below, calculate the percent yield if 200. g of chlorine reacts with excess potassium bromide to produce 410. g of bromine.

 Cl_2 + KBr \rightarrow Br₂ + KCl

- 8. Lead (II) nitrate can be decomposed by heating to form lead (II) oxide, nitrogen monoxide, and oxygen gas. If the percent yield of the decomposition reaction is 82% after 9.9 g of lead (II) nitrate is heated, what was the actual yield of lead (II) oxide?
- For the single displacement reaction of magnesium and hydrochloric acid, calculate the percent yield of magnesium chloride if 100. g of magnesium reacts with excess hydrochloric acid to yield 330. g of magnesium chloride.
- 10. When hydrogen and oxygen react to form water, how many grams of water can be made from 3.83 moles of hydrogen?
- 11. When iron and oxygen combine, iron (III) oxide is formed. How many moles of iron (III) oxide are produced when 0.275 moles of iron is reacted? *
- 12. How many atoms of sulfur are needed to make 6.5 moles of iron (II) sulfide?

 $_Fe_{(s)} + _S_{8(s)} \rightarrow _FeS_{(s)}$

1. If you have 6 moles of zinc and 5 moles of hydrochloric acid, which of these would be the limiting reactant?

$$Zn + 2 HCI \rightarrow ZnCI_2 + H_2$$

- 2. When the limiting reactant in a chemical reaction is completely used, the:
 - a. excess reactants begin combining.
 - b. reaction slows down.
 - c. reaction speeds up.
 - d. reaction stops.
- 3. When combining zinc metal with hydrochloric acid, you notice that you run out of zinc and still have plenty of hydrochloric acid to continue the reaction. What is the term used to describe the zinc?
 - a. Excess
 - b. Limiting
 - c. Product
 - d. Yield
- 4. Hydrogen gas reacts with oxygen gas and produces water. If 1.5 mol of hydrogen reacts with 2.0 mol of oxygen, what is the limiting reactant? (You must write a balanced equation first)
 - a. oxygen gas
 - b. water vapor
 - c. hydrogen gas
 - d. liquid water
- 5. If you have 4 moles of zinc and 4 moles of hydrochloric acid, which of these would be the limiting reactant?

$$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$$

- a. Zinc
- b. hydrochloric acid
- c. zinc chloride
- d. hydrogen gas
- 6. An alkaline battery produces electrical energy according to this balanced equation. Determine the limiting reactant if 25.0 g of Zn and 30.0 g of MnO2 are used. In addition, what mass of Zn(OH)2 will be produced?

$$Zn + 2MnO_2 + H_2O \rightarrow Zn(OH)_2 + Mn_2O_3$$

7. An alkaline battery produces electrical energy according to this balanced equation. If the same 25.0 g of Zn and 30.0 g of MnO2 are used -- how much excess reactant will remain once the reaction is complete? (a HINT a B: The previous short answer question is the first half to this problem!! Do it first if you haven't already!)

$$Zn + 2MnO_2 + H_2O \rightarrow Zn(OH)_2 + Mn_2O_3$$