Name _____ Date _____ Period _____

Stoichiometry Ws # 6: Review

Show all work and the balanced equations for each problem. Circle your final answer with correct units and label.

1. A reaction between hydrazine, N_2H_4, and dinitrogen tetoxide, has been used to launch rockets into space. The reaction produces nitrogen gas and water vapor shown in the unbalanced equation below. N_2H_4 (l) + N_2O_4 (l) → N_2 (g) + H_2O (g)
   a. Write the balanced chemical equation for the reaction.

   b. What is the mole ration of N_2H_4 to N_2?

   c. What amount of water will be produced from 14,000 moles of hydrazine used by the rocket?

2. Oxygen gas and solid potassium chloride can be produced by decomposing potassium chlorate.
   a. Write a balanced equation for the reaction.

   b. If 125 g of $KClO_3$ is heated and decomposes completely, What amount of oxygen gas is produced?

3. Oxygen gas and water are produced by the decomposition of hydrogen peroxide (H_2O_2). If 10.0 mol of H_2O_2 decomposes, what volume of oxygen will be produced? Assume the density of oxygen is 1.42 g/L.

4. Differentiate a limiting reactant from an excess reactant

5. Do all reaction have a limiting reactant? Explain.

6. When copper metal is added to a silver nitrate solution, silver metal and copper II nitrate are produced. If 1.00×10^2g of copper metal is added to a solution containing 1000.0 g of silver nitrate, what mass of silver metal will be produced?

7. Identify the limiting reactant and the excess reactant in the following situations:

a. firewood burning in a campfire
b. sulfur compounds from the air tarnishing silver
c. NO_2 gas reacting with oxygen and water vapor in air to produce acid rain.

8. Hydrochloric acid secreted in your stomach can be neutralized in a double replacement reaction by taking an antacid such as aluminum hydroxide.
   a. Write a balanced equation for the reaction.

   b. If 34.0g HCl are secreted and 12.0g $Al(OH)_3$ are taken, is there enough antacid to react with all of the acid?

9. Ammonia, NH_3, is used throughout the world as a fertilizer. To manufacture ammonia, nitrogen gas is combined with hydrogen gas in a synthesis reaction.
   a. Write a balanced equation for the reaction.

   b. If 92.7Kg N_2 and 265.8kg H_2 are used, which is the limiting reactant?

10. a. Differentiate theoretical yield from actual yield.

    b. How is actual yield determined?

    c. How is theoretical yield determined?

11. Coal gasification is a process that converts coal into methane gas. If this reaction has a percentage yield of 85%, how much methane can be obtained from 1.26 g of coal?

    $C(s) + H_2O(l) \rightarrow CH_4(g) + CO_2(g)$

12. When phosphorous burns in the presence of oxygen, P_4O_{10} is produced. In turn, P_4O_{10} reacts with water to produce phosphoric acid.

    $P_4O_{10}(g) + H_2O(l) \rightarrow H_3PO_4(aq)$

    a. Write the balanced equation for the reaction.

    b. When 1.00×10^2 g of P_4O_{10} reacts with 2.00×10^2g of H_2O, what is the theoretical yield of phosphoric acid?

    c. If the actual yield is 126.2 g of H_3PO_4, what is the percentage yield for this reaction?

13. Can actual yield ever exceed theoretical yield? Explain.