Chemistry 11   **<u>Limiting Reagents and Percent Yield</u>**   Assignment
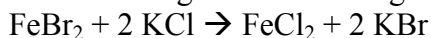
Answer all questions on separate paper and report all answers to the correct number of sig-figs.

1. Identify the limiting reactant when 1.22g of O_2 reacts with 1.05g of H_2 to produce water.

2. Identify the limiting reactant when 5.87g of $Mg(OH)_2$ reacts with 12.84g of HCl to form $MgCl_2$ and water.

3. Identify the limiting reactant when 6.33g of sulphuric acid reacts with 5.92g of sodium hydroxide to produce sodium sulphate and water.

4. Identify the reactant in excess if 6.25g of silver nitrate reacts with 4.12g of sodium chloride to form sodium nitrate and silver chloride.

5. If 4.1g of Cr is heated with 9.3g of Cl_2 what mass of $CrCl_3$ will be produced?

6. What mass of sulphur trioxide is produced when 12.4g of sulphur dioxide is reacted with 3.45g of oxygen gas?

7. If 21.4g of aluminum is reacted with 91.3g of iron (III) oxide, the products will be aluminum oxide and iron. What mass of iron will be produced?

8. If 41.6g of N_2O_4 reacts with 20.8g of N_2H_4, the products will be nitrogen gas and water. What mass of nitrogen will be produced?

9. What mass of NaCl will be produced by the reaction of 58.7g of NaI with 29.4g of Cl_2?

10. a. Write the balanced equation for the reaction of lead (II) nitrate with sodium iodide to form sodium nitrate and lead (II) iodide:

    b. If I start with 25.0 grams of lead (II) nitrate and 15.0 grams of sodium iodide, how many grams of sodium nitrate can be formed?

    c. What is the limiting reagent in the reaction?

    d. How much of the excess reagent will be left over from the reaction?

11. You calculate that using a certain amount of beryllium and hydrochloric acid you can produce 10.7g of beryllium chloride. You perform the experiment and only collect 4.5g. What was the percent yield for the reaction?

12. Determine the percent yield for the reaction between 45.9g of NaBr and excess chlorine gas to produce 12.8g of NaCl and an unknown quantity of bromine gas.

13. Determine the percent yield for the reaction between 44.5g of zinc sulphide and 13.3g of oxygen, if 18.4g of zinc oxide is recovered with an unknown amount of sulphur dioxide.

14. A reaction was carried out according to the following equation:
$$FeBr_2 + 2\ KCl \rightarrow FeCl_2 + 2\ KBr$$
a. What is the theoretical yield of iron (II) chloride if 34.00 grams of iron (II) bromide was used in the reaction with excess potassium chloride?

b. What is the percent yield of iron (II) chloride if the actual yield is 4.00 grams?

15. a. What mass of $CS_{2(s)}$ is produced when 17.5 g of $C_{(s)}$ are reacted with 39.5 g of $SO_{2(g)}$ according to the equation: $5\ C_{(s)} + 2\ SO_{2(g)} \rightarrow CS_{2(s)} + 4\ CO_{(g)}$?

b. What mass of the excess reactant will be left over?

16. If 0.250 g of $Ba(OH)_{2(s)}$ is mixed with 15.0 mL of 0.125 M $HBr_{(aq)}$, what mass of $BaBr_{2(aq)}$ can be formed?
$$Ba(OH)_{2(s)} + 2\ HBr_{(aq)} \rightarrow BaBr_{2(aq)} + 2\ H_2O_{(l)}$$
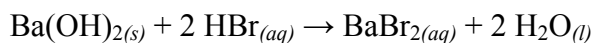
17. The reaction $SiO_{2(s)} + 4\ HF_{(g)} \rightarrow SiF_{4(g)} + 2\ H_2O_{(g)}$ produces 2.50 g of $H_2O_{(g)}$ when 12.20g of $SiO_{2(s)}$ is treated with a small excess of $HF_{(g)}$.

a. What mass of $SiF_{4(g)}$ is formed?

b. What mass of $SiO_{2(s)}$ is left unreacted if only 2.50g of H_2O is formed?

c. What is the percent yield of the $H_2O_{(g)}$?