

Limiting Reactant and Percent Yield Practice

Name _____

- 1) Consider the following reaction:



Which reactant is limiting, assuming we started with 30.0 grams of ammonium nitrate and 50.0 grams of sodium phosphate. What is the mass of each product that can be formed? What mass of the excess reactant(s) is left over?

- 2) Consider the following reaction:



Which reactant is limiting, assuming we start with 100. grams of calcium carbonate and 45.0 grams of iron (III) phosphate. What is the mass of each product that can be formed? What mass of the excess reactant(s) is left over?

3) Write the balanced equation for the reaction given below:



a) If 15 grams of copper (II) chloride react with 20. grams of sodium nitrate, how much sodium chloride can be formed?

b) What is the name of the limiting reagent? _____

c) How much of the excess reagent is left over in this reaction?

d) If 11.3 grams of sodium chloride are formed in the reaction, what is the percent yield of this reaction?

4) Write the equation for the reaction of iron (III) phosphate with sodium sulfate to make iron (III) sulfate and sodium phosphate.

a) If you perform this reaction with 25 grams of iron (III) phosphate and an excess of sodium sulfate, how many grams of iron (III) sulfate can you make?

b) If 18.5 grams of iron (III) sulfate are actually made when you do this reaction, what is your percent yield?

c) Is the answer from problem b) reasonable? Explain.

d) If you do this reaction with 15 grams of sodium sulfate and get a 65.0% yield, how many grams of sodium phosphate will you make?

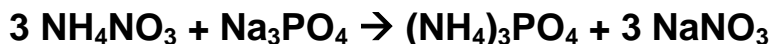
5. Write the balanced equation for the reaction given below:



- a) If 16.4 L of C_2H_6 reacts with 0.980 mol of O_2 how many liters of carbon dioxide gas will be produced?
- b) How many oxygen atoms will be in this sample of carbon dioxide?
- c) How many moles of the excess reactant will be left over?
- d) How many grams of the excess reactant will be left over?
- e) How many of each atom that makes up the excess reactant will be left over?
- 6) Choose three problems from the Ebbing textbook from pp 119-120 on percent and theoretical yield, complete them and staple them to this page

Answer Sheet

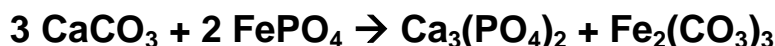
- 1) Consider the following reaction:



Answer the questions above, assuming we started with 30 grams of ammonium nitrate and 50 grams of sodium phosphate.

- **ammonium nitrate is limiting**
- **18.6 grams of ammonium phosphate, 31.9 grams of sodium nitrate**
- **29.5 grams of sodium phosphate**

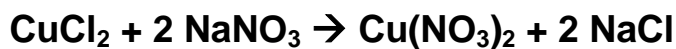
- 2) Consider the following reaction:



Answer the questions at the top of this sheet, assuming we start with 100 grams of calcium carbonate and 45 grams of iron (II) phosphate.

- **iron (III) phosphate is limiting**
- **46.3 grams of calcium phosphate, 43.8 grams of iron (III) carbonate**
- **54.0 grams of calcium carbonate**

- 3) Write the balanced equation for the reaction given below:



- a) If 15 grams of copper (II) chloride react with 20 grams of sodium nitrate, how much sodium chloride can be formed?

To solve this problem determine how much sodium chloride can be made from each of the reagents by themselves. When you work out how much sodium chloride can be made with 15 grams of copper (II) chloride, you find that 13 grams will be formed. When starting with 20 grams of sodium nitrate, 14 grams will be formed. Since 13.0 grams is the smaller number, that's our answer. Please note that rounding differences may cause your answers to be slightly different, so if they are, don't panic.

- b) What is the limiting reagent for the reaction in a)? **copper (II) chloride**

c) How much of the excess reagent is left over in this reaction?

$$\text{excess reagent remaining} = 20 \text{ grams} - 19 \text{ grams (13.0 / 13.6)} \\ = 1 \text{ grams}$$

d) If 11.3 grams of sodium chloride are formed in the reaction described in problem a), what is the percent yield of this reaction?

$$11.3/13.0 \times 100\% = 86.9\%$$

4) Write the equation for the reaction of iron (III) phosphate with sodium sulfate to make iron (III) sulfate and sodium phosphate.



a) If I perform this reaction with 25 grams of iron (III) phosphate and an excess of sodium sulfate, how many grams of iron (III) sulfate can I make?

17.2 grams

b) If 18.5 grams of iron (III) sulfate are actually made when I do this reaction, what is my percent yield?

$$(18.5 / 17.2) \times 100\% = 108\%$$

c) Is the answer from problem b) reasonable? Explain.

No. Any yield over 100% is a violation of the Law of conservation of mass.

d) If I do this reaction with 15 grams of sodium sulfate and get a 65.0% yield, how many grams of sodium phosphate will I make?

According to the stoichiometry, the theoretical yield is 11.5 grams. Multiplying this by 0.650, you get 7.48 grams.

5)



a) If 16.4 L of C_2H_6 reacts with 0.980 mol of O_2 how many liters of carbon dioxide gas will be produced?

12.5 L CO_2

b) How many oxygen atoms will be in this sample of carbon dioxide?

6.74E^{23} oxygen atoms

c) How many moles of the excess reactant will be left over?

0.453 mol C_2H_6 excess

d) How many grams of the excess reactant will be left over?

13.6 g C_2H_6 excess

e) How many of each atom that makes up the excess reactant will be left over?

**5.45E^{23} carbon atoms left
 1.64E^{24} hydrogen atoms left**