

Percent Yield Calculations

- 1) Balance this equation and state which of the six types of reaction is taking place:



Type of reaction: Single displacement

- 2) If I start this reaction with 40 grams of magnesium and an excess of nitric acid, how many grams of hydrogen gas will I produce?

$$40 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.31 \text{ g Mg}} \times \frac{1 \text{ mol H}_2}{1 \text{ mol Mg}} \times \frac{2.016 \text{ g H}_2}{1 \text{ mol H}_2} = \boxed{3.3 \text{ g H}_2}$$

- 3) If 1.7 grams of hydrogen is actually produced, what was my percent yield of hydrogen?

$$\frac{1.7 \text{ g H}_2}{3.3 \text{ g H}_2} \times 100 = \boxed{52\%}$$

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- 4) Balance this equation and state what type of reaction is taking place:



Type of reaction: decomposition

- 5) If 25 grams of carbon dioxide gas is produced in this reaction, how many grams of sodium hydroxide should be produced?

$$25 \text{ g CO}_2 \times \frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol CO}_2} \times \frac{40.00 \text{ g NaOH}}{1 \text{ mol NaOH}} = \boxed{22.7 \text{ g NaOH}}$$

- 6) If 50 grams of sodium hydroxide are actually produced, what was my percent yield?

$$\frac{50 \text{ g}}{22.7 \text{ g}} \times 100 = \boxed{220\% \quad \text{Not reasonable}}$$

Percent Yield Worksheet

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



- 2) 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?

$$25 \text{ g } \cancel{\text{FePO}_4} \times \frac{1 \text{ mol } \cancel{\text{FePO}_4}}{150.82 \text{ g } \cancel{\text{FePO}_4}} \times \frac{1 \text{ mol } \text{Fe}_2(\text{SO}_4)_3}{2 \text{ mol } \cancel{\text{FePO}_4}} \times \frac{399.9 \text{ g } \text{Fe}_2(\text{SO}_4)_3}{1 \text{ mol } \text{Fe}_2(\text{SO}_4)_3}$$
$$= 33 \text{ g } \text{Fe}_2(\text{SO}_4)_3$$

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

$$\frac{18.5 \text{ g } \text{Fe}_2(\text{SO}_4)_3}{33 \text{ g } \text{Fe}_2(\text{SO}_4)_3} \times 100\% = 56\%$$

- 4) Is the answer from problem #3 reasonable? Explain.

Yes. It is under 100%.

- 5) 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?

$$15 \text{ g } \cancel{\text{Na}_2\text{SO}_4} \times \frac{1 \text{ mol } \cancel{\text{Na}_2\text{SO}_4}}{142.00 \text{ g } \cancel{\text{Na}_2\text{SO}_4}} \times \frac{2 \text{ mol } \text{Na}_3\text{PO}_4}{3 \text{ mol } \cancel{\text{Na}_2\text{SO}_4}} \times \frac{163.94 \text{ g } \text{Na}_3\text{PO}_4}{1 \text{ mol } \text{Na}_3\text{PO}_4}$$
$$= (11.54507 \text{ g } \text{Na}_3\text{PO}_4) (65.0\%)$$
$$= 7.5 \text{ g } \text{Na}_3\text{PO}_4$$