

STOICHIOMETRY: PERCENT YIELD NOTES

Ketzbook's Stoichiometry Tricks Video

Vocabulary:

- *Theoretical Yield*- The maximum amount of product you can make with what you have.
- *Actual Yield*-The amount of product that is actually made and collected.
- *Percent Yield* - Tells you how well your reaction actually worked.

Percent Yield Set up:

$$\frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\% = \text{Percent Yield}$$

Steps for Calculating Percent Yield:

1. Solve for the theoretical yield by following the steps for grams to grams conversions:
 - a) Balance the equation.
 - b) Convert grams A given in the problem to moles of A by dividing by the molar(molecular) mass of A from the periodic table.
 - c) Determine the mole to mole ratio between A and B.
 - d) Convert moles of B to the mass of B by multiplying the molecular mass of B.
 - e) Multiply across, divide bottom.
2. Divide the theoretical yield from the actual provided in the question.
3. Multiply by 100 to get the percentage.

Problem:

In the lab, 10.0 g of KClO_3 were carefully decomposed, and 3.41 g of O_2 gas were collected. What are the theoretical, actual, and percent yields of the reaction?

1. Balance reaction:
 $2\text{KIO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
2. Mass of A(KIO_3) given: *10 g KIO_3*
3. Molar mass of A(KIO_3): *122.5 g KIO_3*
4. Mole to mole ratio of A and B: *2 mol of A to 3 mol of B (2:3)*
5. Molar Mass of B(O_2): *32 g O_2*
6. Use the given information to solve for theoretical yield:

| | | | | |
|---------------------------------------|--|--|--------------------------------------|---|
| <i>10 g KIO_3</i> | <i>1 mol KIO_3</i> | <i>3 mol O_2</i> | <i>32 g O_2</i> | <i>= 3.92 g O_2</i> |
| | <i>122.5 g KIO_3</i> | <i>2 mol KIO_3</i> | <i>1 mol O_2</i> | |

7. Solve for the percent yield:

$$\frac{3.41 \text{ g O}_2}{3.92 \text{ g O}_2} \times 100\% = 87\%$$

If your actual yield is greater than your theoretical, what could that suggest?

You made a mistake and need to redo the experiment or double-check your calculations.

*Adapted from: YouTube. (2017a, March 29). Stoichiometry tricks. YouTube.
https://www.youtube.com/watch?v=_xeqkSQbOPg*