

## Percent Yield

The amount of a product formed when the limiting reactant is completely consumed is called the **theoretical yield** of that product. This is the *maximum amount* of product that could be produced from the quantities of reactants used.

In reality, the amount of product predicted by the theoretical yield is seldom obtained. The **actual yield** is the amount of product actually produced when the chemical reaction is carried out in an experiment.

The actual yield is often given as a percentage of the theoretical yield. This is called the **percent yield**:

$$\text{percent yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100\%$$

**Example 1**

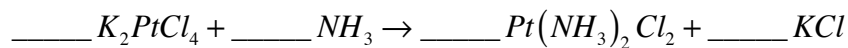
When potassium chromate ( $K_2CrO_4$ ) is added to a solution containing 0.5 g silver nitrate ( $AgNO_3$ ), solid silver chromate ( $Ag_2CrO_4$ ) is formed.

a) Determine the theoretical yield of the silver chromate precipitate.

b) If 0.455 g of silver chromate is obtained, calculate the percent yield.

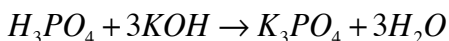
## Percent Yield Worksheet

1. Given the following equation:



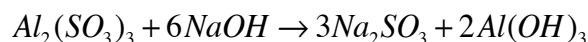
- Balance the equation.
- Determine the theoretical yield of  $KCl$  if you start with 34.5 g  $NH_3$ .
- If 76.4 g  $Pt(NH_3)_2Cl_2$  are produced when you actually carry out this experiment, what is the percent yield?

2. Given the following equation:



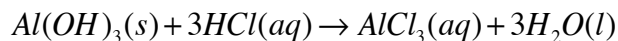
- If 49.0 g  $H_3PO_4$  is reacted with excess  $KOH$ , determine the theoretical yield of  $K_3PO_4$ .
- If 49.0 g  $K_3PO_4$  are produced when you actually carry out this experiment, what is the percent yield?

3. Given the following equation:



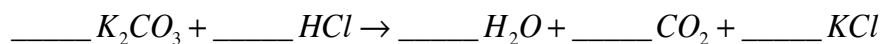
If you start with 389.4 g  $Al_2(SO_3)_3$  and produce 212.4 g  $Na_2SO_3$ , what is the percent yield for this reaction?

4. Given the following equation:



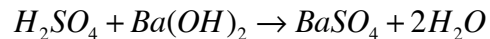
If you start with 50.3 g  $Al(OH)_3$  and produce 39.5 g  $AlCl_3$ , what is the percent yield?

5. Given the following equation:



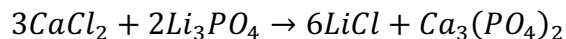
- Balance the equation.
- Determine the theoretical yield of  $KCl$  if you start with 34.5 g  $K_2CO_3$ .
- If 3.4 g  $H_2O$  are produced when you actually carry out this experiment, what is the percent yield?

6. Given the following equation:



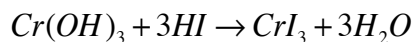
- If 98.0 g  $H_2SO_4$  is reacted with excess  $Ba(OH)_2$ , determine the theoretical yield of  $BaSO_4$ .
- If 213.7 g  $BaSO_4$  are produced when you actually carry out this experiment, what is the percent yield?

7. Given the following equation:



If you start with 82.4 g  $CaCl_2$  and produce 52.3 g  $Ca_3(PO_4)_2$ , what is the percent yield?

8. Given the following equation:



If you start with 50.3 g  $Cr(OH)_3$  and produce 39.5 g  $CrI_3$ , what is the percent yield?