

Section 12.4 Percent Yield

In your textbook, read about the yields of products.

Study the diagram and the example problem.

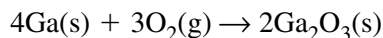
$$\text{percent yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100\%$$

mass of product from experimental measurement

mass of product predicted from stoichiometric calculation using

- a. mass of reactant
- b. 4-step mass-to-mass conversion
 1. Write the balanced chemical equation.
 2. Calculate the number of moles of reactant, using molar mass.
 3. Calculate the number of moles of product, using the appropriate mole ratio.
 4. Calculate the mass of product, using the reciprocal of molar mass.

Example Problem: The following chemical equation represents the production of gallium oxide, a substance used in the manufacturing of some semiconductor devices.



In one experiment, the reaction yielded 7.42 g of the oxide from a 7.00-g sample of gallium. Determine the percent yield of this reaction. The molar masses of Ga and Ga_2O_3 are 69.72 g/mol and 187.44 g/mol, respectively.

Use the information in the diagram and example problem to evaluate each value or expression below. If the value or expression is correct, write *correct*. If it is incorrect, write the correct value or expression.

1. actual yield: unknown _____

2. mass of reactant: 7.00 g Ga _____

3. number of moles of reactant: $7.00 \text{ g Ga} \times \frac{69.72 \text{ g Ga}}{1 \text{ mol Ga}}$ _____

4. number of moles of product: $0.100 \text{ mol Ga} \times \frac{2 \text{ mol Ga}_2\text{O}_3}{1 \text{ mol Ga}}$ _____

5. theoretical yield: $0.0500 \text{ mol Ga}_2\text{O}_3 \times \frac{187.44 \text{ g Ga}_2\text{O}_3}{1 \text{ mol Ga}_2\text{O}_3}$ _____

6. percent yield: $\frac{9.37 \text{ g Ga}_2\text{O}_3}{7.42 \text{ g Ga}_2\text{O}_3} \times 100$ _____