Percent yield — Student Worksheet

Mole ratios, theoretical yield, recovered product.

Name: _____ Date: _____ Section: _____

Learning goal: carry units through the calculation, show an equation, and explain the measurement assumptions.

Numerical practice

1. Reaction yield case 1

Balanced equation: 2 Mg + O2 → 2 MgO. Starting Mg: 4.862 g; molar mass Mg: 24.31 g/mol; molar mass MgO: 40.31 g/mol; actual MgO recovered: 6.85 g.

(a) Convert grams of Mg using its molar mass. [Answer in mol]

Working: _____

(b) Use the balanced mole ratio (1:1 product:reactant) and product molar mass to obtain grams of MgO. [Answer in g]

Working: _____

(c) Divide actual yield by theoretical yield and multiply by 100. [Answer in %]

Working: _____

2. Reaction yield case 2

Balanced equation: CaCO3 → CaO + CO2. Starting CaCO3: 20.02 g; molar mass CaCO3: 100.09 g/mol; molar mass CaO: 56.08 g/mol; actual CaO recovered: 9.53 g.

(a) Convert grams of CaCO3 using its molar mass. [Answer in mol]

Working: _____

(b) Use the balanced mole ratio (1:1 product:reactant) and product molar mass to obtain grams of CaO. [Answer in g]

Working: _____

(c) Divide actual yield by theoretical yield and multiply by 100. [Answer in %]

Working: _____

3. Reaction yield case 3

Balanced equation: Fe2O3 + 3 CO → 2 Fe + 3 CO2. Starting Fe2O3: 15.97 g; molar mass Fe2O3: 159.70 g/mol; molar mass Fe: 55.85 g/mol; actual Fe recovered: 9.10 g.

(a) Convert grams of Fe2O3 using its molar mass. [Answer in mol]

Working: _____

(b) Use the balanced mole ratio (2:1 product:reactant) and product molar mass to obtain grams of Fe. [Answer in g]

Working: _____

(c) Divide actual yield by theoretical yield and multiply by 100. [Answer in %]

Working: _____

4. Reaction yield case 4

Balanced equation: Zn + 2 HCl → ZnCl2 + H2. Starting Zn: 6.538 g; molar mass Zn: 65.38 g/mol; molar mass ZnCl2: 136.28 g/mol; actual ZnCl2 recovered: 11.80 g.

(a) Convert grams of Zn using its molar mass. [Answer in mol]

Working: _____

(b) Use the balanced mole ratio (1:1 product:reactant) and product molar mass to obtain grams of ZnCl2. [Answer in g]

Working: _____

(c) Divide actual yield by theoretical yield and multiply by 100. [Answer in %]

Working: _____

Concept and interpretation

5. Can an experimental yield above 100% automatically be considered chemically valid?

_____

_____

6. Explain the difference between theoretical and actual yield.

_____

_____

Note: Report an appropriate number of significant figures for measured quantities. The online checker evaluates numeric accuracy separately from precision.