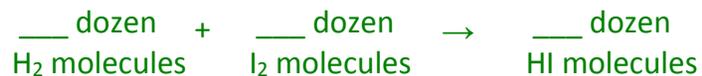
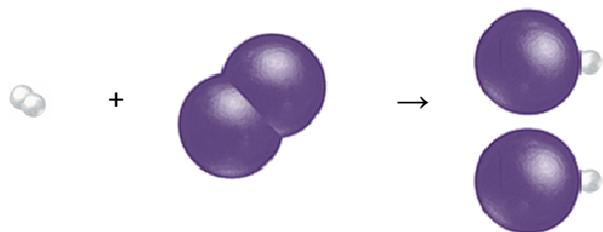
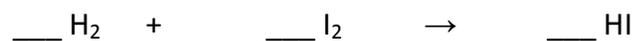


Chapter 8: Quantities in chemical reactions

Stoichiometry: study of mass and amounts in chemical reactions

What masses of H₂ and I₂ are required to make 10.0 g HI?



A **mole ratio** can be created with coefficients in balanced chemical equation

Mole ratios

In the balanced chemical equation on the previous page, how many moles H₂ are required to form 5.3 mol HI?

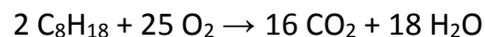


If 2.3 mol Cu react, how many mol AgNO₃ will react?

How many grams H₂ are required to form 10.0 g HI?



Stoichiometry problems



How many grams CO_2 are produced from combustion of 100. g octane (C_8H_{18})?

How many grams CO_2 are produced from combustion of 100. g propane, C_3H_8 ?

There is **no direct route** from mass to mass. (Use the mol ratio in the middle of a $\text{g} \rightarrow \text{mol} \rightarrow \text{mol} \rightarrow \text{g}$ calculation)

Only use the coefficients in the mol ratio, **not** in molar masses!

Limiting reactant

What if you're given masses of two reactants and are asked for product mass?

17.3 g P are reacted with 15.4 g O_2 . How many grams P_2O_5 can be produced?



This is a **limiting reactant** problem:

- One reactant is consumed before the other
- Once one reactant is consumed, the reaction
- The reactant that's consumed first is the limiting reactant

Yield calculations

Theoretical yield: product mass from a stoichiometry calculation. Maximum amount of product that can be formed under ideal conditions.

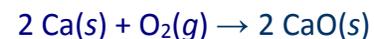
Actual yield: isolated product mass from real reaction in a real lab. Always smaller than theoretical yield.

Percent yield:

Say the actual yield of the previous reaction was 25.2 g P₂O₅. What was the percent yield?

Limiting reactant practice

If 4.20 g Ca reacted with 2.80 g O₂, what is the theoretical yield of CaO? Which is the limiting reactant? What was the % yield if 4.93 g CaO were produced?



If 12.3 g Na react with 0.750 g H₂, what is the theoretical yield of NaH? Which is the limiting reactant? If 8.24 g NaH were produced, what was the % yield?

