

Section 8-1 Describing Chemical Reactions

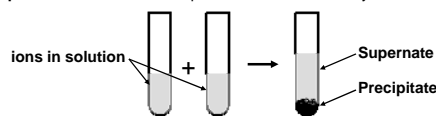
8-1 Describing Chemical Reactions

Chemical Equation – identifies and relates the amounts of reactants and products in a chemical reaction

Some Indicators of a Chemical Reaction

- 1) Heat and light have been released
- 2) A gas is produced (you see bubbles)
- 3) A precipitate is formed (a solid forms from two liquids)

Precipitate – a solid that has separated from a solution by a chemical reaction



If you are not part of the solution... You are a part of the precipitate! 1

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Characteristics of a Chemical Equation

- 1) Must represent reactants and products
- 2) Must have correct chemical formulas
- 3) Law of conservation must be satisfied

Coefficient – number indicating how many of something (just like math!)

Word Equation – uses words to describe a reaction

Methane + oxygen → carbon dioxide + water (“→” means “yields”)

Formula Equation – uses symbols used to describe a reaction

$\text{CH}_4 + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$ (Balanced)

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Symbols Used in Chemical Equations (Table 8-2 p146)

→
Yields (reaction result)

⇌
Reversible Reaction

State of Reactant or Product

(s) solid ↓ Precipitate
(l) liquid
(g) gas ↑ Gaseous product
(aq) aqueous – dissolved in water

Special Conditions of a Reaction

$\xrightarrow{\Delta}$
 $\xrightarrow{\text{Heat}}$ } Reactants heated

$\xrightarrow{2 \text{ atm}}$ At specified pressure
 $\xrightarrow{\text{pressure}}$ Under pressure

$\xrightarrow{0^\circ\text{C}}$ At specified temp

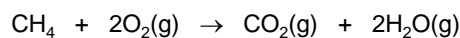
$\xrightarrow{\text{MnO}_2}$ Catalyst used to speed/slow reaction

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Significance of a Chemical Equation

- 1) Coefficients show relative amounts of reactants and products
- 2) Coefficients can determine relative masses of reactants and products
- 3) The reverse and forward reactions have same relative amounts



1 mole 2 mole 1 mole 2 mole

$\left[\frac{16\text{g}}{\text{mol}} \right]$ $\left[\frac{32\text{g}}{\text{mol}} \right]$ $\left[\frac{44\text{g}}{\text{mol}} \right]$ $\left[\frac{18\text{g}}{\text{mol}} \right]$

16g CH₄ 64g O₂ 44g CO₂ 36g H₂O

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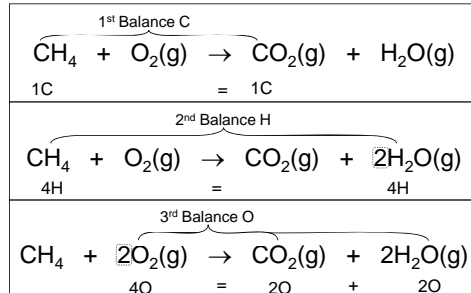
Balancing a Chemical Equation

- 1) Write word equation
methane + oxygen → carbon dioxide + water
- 2) Change names to formulas
 $\text{CH}_4 + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$ (Unbalanced)
- 3) Balance using Law of Conservation (Trial and Error!!)
 - a) Balance elements one at a time
 - b) Balance combined elements appearing once on each side first
 - c) Balance polyatomic ions on both sides as single units
 - d) Balance H and O last

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8-1 Describing Chemical Reactions

Balancing a Chemical Equation (Cont'd)



1C + 4H + 4O + = 1C + 2O + 4H + 2O

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