

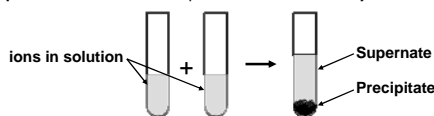
## 8-1 Describing Chemical Reactions

**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! <sup>1</sup>

## 8-1 Describing Chemical Reactions

### 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)

## 8-1 Describing Chemical Reactions

### 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

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

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

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

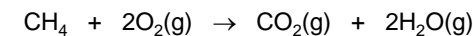
$\xrightarrow{\text{MnO}_2}$   
Catalyst used to speed/slow reaction

<sup>3</sup>

## 8-1 Describing Chemical Reactions

### 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 CH<sub>4</sub>      64g O<sub>2</sub>      44g CO<sub>2</sub>      36g H<sub>2</sub>O

<sup>4</sup>

## 8-1 Describing Chemical Reactions

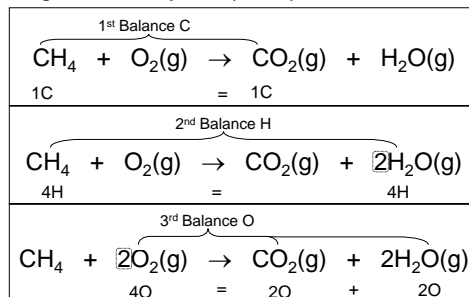
### Balancing a Chemical Equation

- 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

<sup>5</sup>

## 8-1 Describing Chemical Reactions

### Balancing a Chemical Equation (Cont'd)



$1\text{C} + 4\text{H} + 4\text{O} + = 1\text{C} + 2\text{O} + 4\text{H} + 2\text{O}$

<sup>6</sup>