

# PowerPoint Lectures

to accompany

# Physical Science, 9e

## Chapter 10

## Chemical Reactions



# Chemical Reactions

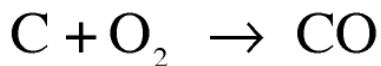
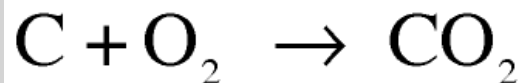
- Occur through formation and breaking of chemical bonds between atoms
- Involve changes in matter, creation of new materials and energy exchange
- *Chemical equations* - concise representation of chemical reactions

# Chemical Equations

- Reactants - substances existing before reaction
- Products - substances existing after reaction
- Word representation not sufficiently precise
- Chemical symbols and formulas needed for quantitative purposes

reactants  $\rightarrow$  products

carbon + oxygen  $\rightarrow$  carbon monoxide

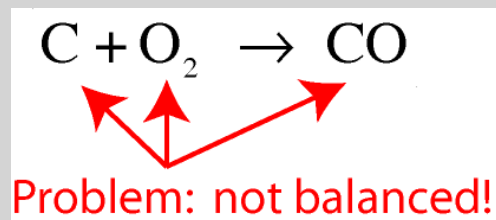


  
Problem: not balanced!







# Balancing Equations

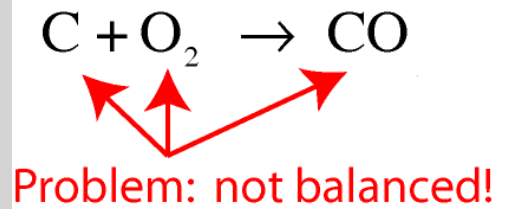
- Law of conservation of mass - atoms are neither created nor destroyed in chemical reactions
- Change coefficients in front of chemical formulas, not subscripts within formulas, to balance

mass of reactants = mass of products



# Meaning of Subscripts and Coefficients with a Chemical Formula

C	means		One atom of carbon
O	means		One atom of oxygen
O <sub>2</sub>	means		One molecule of oxygen consisting of two atoms of oxygen
CO	means		One molecule of carbon monoxide consisting of one atom of carbon attached to one atom of oxygen
CO <sub>2</sub>	means		One molecule of carbon dioxide consisting of one atom of carbon attached to two atoms of oxygen
3 CO <sub>2</sub>	means		Three molecules of carbon dioxide, each consisting of one atom of carbon attached to two atoms of oxygen



# Combination Reactions

- Synthesis reaction in which two or more substances combine to form single compound
- $X + Y \rightarrow XY$



# Decomposition

- A compound is broken down into simpler substances
- $XY \rightarrow X + Y$



# Replacement Reactions

- An atom or polyatomic ion is replaced in a compound by a different atom or polyatomic ion.



OR



**FIGURE 10.13** This shows a reaction between metallic aluminum and the blue solution of copper(II) chloride. Aluminum is above copper in the activity series, and aluminum replaces the copper ions from the solution as copper is deposited as a metal. The aluminum loses electrons to the copper and forms aluminum ions in solution.



# Ion Exchange Reactions Or Double Replacement

- A reaction that takes place when the ions of one compound interact with the ions of another compound forming
  - A solid precipitate
  - A gas
  - Water

