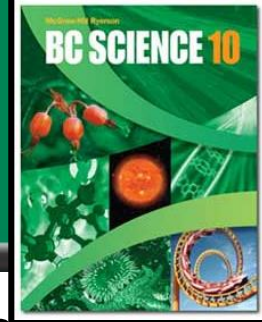
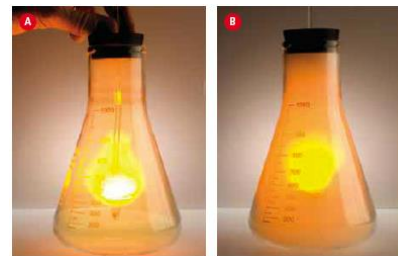


# 6.1 Types of Chemical Reactions: Synthesis



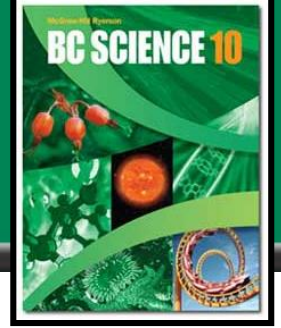
- **Synthesis reactions are also known as formation reactions.**
  - ◆ **Two or more reactants (usually elements) join to form a compound.**
  - ◆  **$A + B \rightarrow AB$  where A and B represent elements**
  - ◆ **The elements may form ionic compounds, like the following:**
  - ◆ **Sodium metal and chlorine gas combine to form sodium chloride.**
  - ◆  **$2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$**
  - ◆ **Magnesium metal reacts with oxygen gas to form magnesium oxide.**
  - ◆  **$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$**
  - ◆ **Or the elements may form covalent compounds, like the following:**
  - ◆ **Nitrogen gas and oxygen gas join to form dinitrogen monoxide.**
  - ◆  **$2\text{N}_2 + \text{O}_2 \rightarrow 2\text{N}_2\text{O}$**



Sodium added to chlorine gas

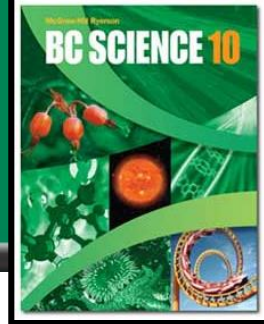
See pages 258 - 259

# Practice Problems



- **Pg 259 #1-2**

# Types of Chemical Reactions: Decomposition

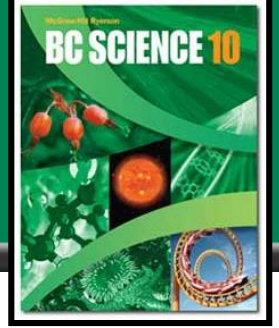


- **Decomposition reactions are the opposite of synthesis reactions.**
  - ◆ A compound breaks down into two or more products (often elements).
  - ◆  $AB \rightarrow A + B$  where A and B represent elements
  - ◆ Ionic compounds may decompose to produce elements, like the following:
    - ◆ Table salt, sodium chloride, can be broken down into sodium metal and chlorine gas by melting salt at  $800^{\circ}\text{C}$  and running electricity through it.
    - ◆  $2\text{NaCl} \rightarrow 2\text{Na} + \text{Cl}_2$
  - ◆ Or covalent compounds may decompose into elements, like the following:
    - ◆ By running electricity through water, the water molecules decompose into hydrogen and oxygen gases.
    - ◆  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$



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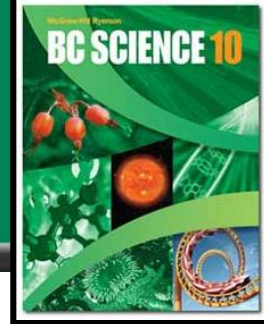
# Practice Problems



- **Pg 260 #1-2**

# Types of Chemical Reactions:

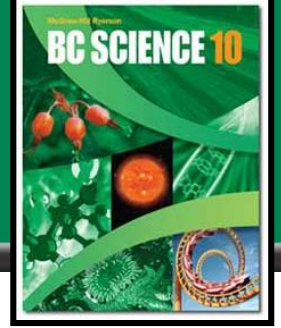
## Single Replacement



- **Single replacement reactions replace one element from a compound with a separate element added as a reactant.**
  - ◆ **A compound and an element react, and the element switches places with part of the original compound.**
    - $A + BC \rightarrow B + AC$  where A is a metal, or
    - $A + BC \rightarrow C + BA$  where A is a non-metal
  - ◆ **When A is a metal:**
    - ◆ **Aluminum foil in a solution of copper(II) chloride produces solid copper and aluminum chloride.**
    - ◆  $2Al + 3CuCl_2 \rightarrow 3Cu + 2AlCl_3$
  - ◆ **When A is a non-metal:**
    - ◆ **When fluorine is bubbled through a sodium iodide solution, iodine and sodium fluoride are produced.**
    - ◆  $F_2 + 2NaI \rightarrow I_2 + 2NaF$

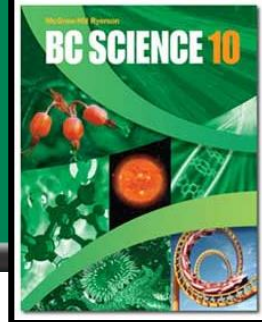
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# Practice Problems



- Pg 261 #1-2

# Types of Chemical Reactions: Double Replacement



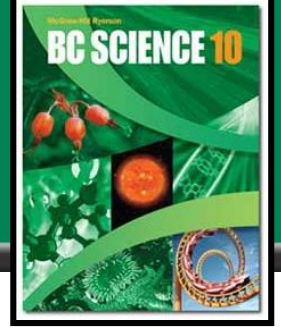
- **Double replacement reactions swap elements between two compounds reacting together to form two new compounds.**
  - ◆ **Two compounds react, with elements switching places between the original compounds.**
  - ◆ **Two solutions react to form a precipitate (ppt, solid) and another solution**
    - **Ionic solution + ionic solution → ionic solution + ionic solid**
    - **AB + CD → AD + CB**
  - ◆ **When potassium chromate and silver nitrate react, they form a red precipitate, silver chromate, in a solution of potassium nitrate.**
  - ◆  **$K_2CrO_4 + 2AgNO_3 \rightarrow Ag_2CrO_4 + 2KNO_3$**



silver  
chromate

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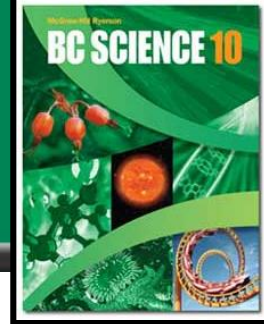
# Practice Problems



- Pg 262 #1-2



# Types of Chemical Reactions: Combustion



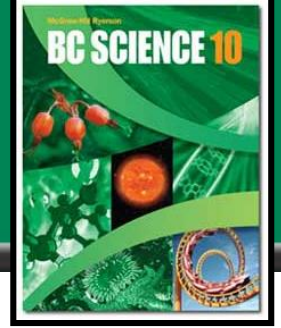
- **Combustion reactions occur when a compound or element react with oxygen to release energy and produce an oxide.**
  - ◆ Also sometimes referred to as hydrocarbon combustion.
  - ◆  $C_XH_Y + O_2 \rightarrow CO_2 + H_2O$  where X and Y represent integers
  - ◆ Natural gas (methane) is burned in furnaces to heat homes.
  - ◆  $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$
  - ◆ An acetylene torch is used to weld metals together.
  - ◆  $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$
  - ◆ Carbohydrates like glucose combine with oxygen in our body to release energy.
  - ◆  $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Acetylene torch



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# Practice Problems



- Pg 264 #1-2