

**SECTION 6.1**  
**TYPES OF**  
**CHEMICAL**  
**REACTIONS**

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# SYNTHESIS (COMBINATION) REACTION

- Reaction between two or more reactants (A and B) to produce a single product (AB)
- element + element → compound
- $A + B \rightarrow AB$ 
  - (The letters A and B represent elements.)
- **Example**
  - hydrogen + oxygen → water



# DECOMPOSITION REACTION

- Reaction where a compound is broken down into smaller compounds or separate elements
- Is the reverse of a synthesis reaction.
- compound → element + element
- $AB \rightarrow A + B$
- **Example**
  - calcium chlorate → calcium chloride + oxygen

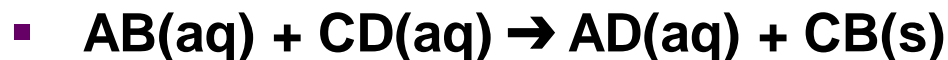
# 3 SINGLE REPLACEMENT REACTION

- Reaction between a reactive element and a compound to produce another element and another compound.
- The element that is replaced could be a metal or a non-metal.
- element + compound → element + compound
- $A + BC \rightarrow B + AC$  where A is a metal  
OR
- $A + BC \rightarrow C + BA$  where A is a non-metal
- **Example**
  - aluminum + lead(II) nitrate → aluminum nitrate + lead

# 4 DOUBLE REPLACEMENT REACTION

- A reaction that involves two ionic solutions that react to produce two other ionic compounds.
- One of the compounds forms a precipitate, which is an insoluble solid that forms from a solution.

ionic solution + ionic solution → ionic solution + ionic solid



- Example

iron(II) chloride + lithium phosphate → iron(II) phosphate + lithium chloride

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## NEUTRALIZATION (ACID-BASE) REACTION

- A reaction where an acid and a base react to form a salt and water.
- acid + base → salt + water
- $\text{HX} + \text{MOH} \rightarrow \text{MX} + \text{H}_2\text{O}$
- (X represents a negative ion. M represents a positive ion.)
- **Example:**
  - sulphuric acid + sodium hydroxide → sodium sulphate + water



# COMBUSTION REACTION

- Rapid reaction of a compound or element with oxygen to form an oxide and produce heat.

hydrocarbon + oxygen → carbon dioxide + water

- $C_xH_y + O_2 \rightarrow CO_2 + H_2O$ 
  - (The subscripts X and Y represent integers.)
- **Example:**
  - $C_2H_6O_3 + O_2 \rightarrow CO_2 + H_2O$

# THE SIX TYPES OF CHEMICAL REACTIONS

Reaction Type	Reactants and Products	Notes on the Reactants
Synthesis (combination)	$A + B \rightarrow AB$	<ul style="list-style-type: none"><li>• Two elements combine</li></ul>
Decomposition	$AB \rightarrow A + B$	<ul style="list-style-type: none"><li>• One reactant only</li></ul>
Single replacement If A is a metal If A is a non-metal	$A + BC \rightarrow B + AC$ $A + BC \rightarrow C + BA$	<ul style="list-style-type: none"><li>• One element and one compound</li></ul>
Double replacement	$AB + CD \rightarrow AD + CB$	<ul style="list-style-type: none"><li>• Two compounds react.</li></ul>
Neutralization (acid-base)	$HX + MOH \rightarrow MX + H_2O$	<ul style="list-style-type: none"><li>• Acid plus base</li></ul>
Combustion	$C_xH_y + O_2 \rightarrow CO_2 + H_2O$	<ul style="list-style-type: none"><li>• Organic compound with oxygen</li></ul>