

Types of Chemical Reactions

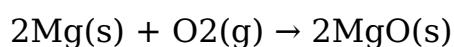
In this chapter, we will study about the various types of chemical reactions and their symbolic representation.

1.2.1 Combination Reaction

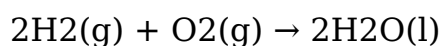
A combination reaction is a chemical reaction in which two or more substances (elements or compounds) combine to form a single product.

Examples of combination reactions:

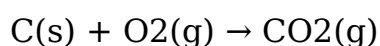
- Burning of magnesium in air to form magnesium oxide:



- Burning of hydrogen in air to form water:



- Formation of carbon dioxide from carbon and oxygen:



Characteristics of combination reactions:

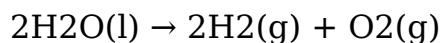
- Combination reactions are always exothermic, meaning that they release heat.
- The products of a combination reaction are always more complex than the reactants.
- Combination reactions are often used to synthesize new compounds.

1.2.2 Decomposition Reaction

A decomposition reaction is a chemical reaction in which a single compound breaks down into two or more simpler substances.

Examples of decomposition reactions:

- Decomposition of water into hydrogen and oxygen:



- Decomposition of limestone into calcium oxide and carbon dioxide:



- Decomposition of ammonia into nitrogen and hydrogen:



Characteristics of decomposition reactions:

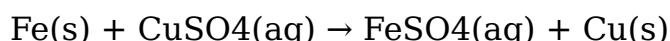
- Decomposition reactions are always endothermic, meaning that they absorb heat.
- The products of a decomposition reaction are always simpler than the reactants.
- Decomposition reactions are often used to extract metals from their ores.

1.2.3 Single-Replacement Reaction

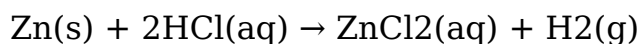
A single-replacement reaction is a chemical reaction in which one element replaces another element in a compound.

Examples of single-replacement reactions:

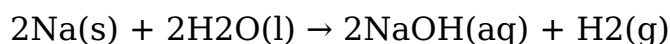
- Reaction of iron with copper sulfate to form iron sulfate and copper:



- Reaction of zinc with hydrochloric acid to form zinc chloride and hydrogen:



- Reaction of sodium with water to form sodium hydroxide and hydrogen:



Characteristics of single-replacement reactions:

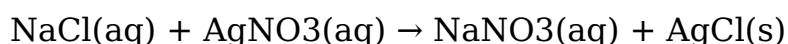
- Single-replacement reactions can be either exothermic or endothermic.
- The products of a single-replacement reaction are always different from the reactants.
- Single-replacement reactions are often used to extract metals from their ores.

1.2.4 Double-Replacement Reaction

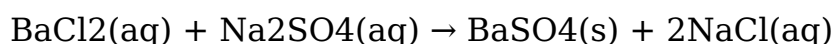
A double-replacement reaction is a chemical reaction in which two compounds exchange ions to form two new compounds.

Examples of double-replacement reactions:

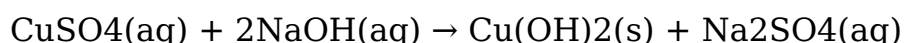
- Reaction of sodium chloride and silver nitrate to form sodium nitrate and silver chloride:



- Reaction of barium chloride and sodium sulfate to form barium sulfate and sodium chloride:



- Reaction of copper sulfate and sodium hydroxide to form copper hydroxide and sodium sulfate:



Characteristics of double-replacement reactions:

- Double-replacement reactions can be either exothermic or endothermic.
- The products of a double-replacement reaction are always different from the reactants.
- Double-replacement reactions are often used to precipitate solids from solution.