Types of Chemical Reactions
There are several types of chemical reactions. We will discuss five main types.

- Combustion
- Synthesis
- Decomposition
- Single Displacement
- Double Displacement
Combustion

* When a substance reacts (burns) oxygen to produce an oxide

* General Equation

\[ HC + O_2 \rightarrow CO_2 + H_2O + E \]

HC stands for hydrocarbon, any combination of hydrogen and carbon
Combustion

* Energy produced is usually heat or light
* When energy is produced during a reaction we call it exothermic
* Represent this as ‘E’ in equation
Synthesis reactions occur when there is a combination of smaller atoms/molecules into larger molecules.

General Equation:

\[ A + B \rightarrow AB \]
Synthesis

Examples:

\[ \text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \]

\[ \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{CO}_3(\text{aq}) \]
Decomposition reactions occur when there is a splitting of large molecules into elements or smaller molecules.

* General Equation

\[ AB \rightarrow A + B \]
Decomposition

Examples:

- $\text{H}_2\text{O}(l) \rightarrow \text{H}_2(g) + \text{O}_2(g)$
- $\text{H}_2\text{CO}_3(aq) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l)$
A reaction in which one element displaces another element from a compound.

General Equation

\[ A + BX \rightarrow B + AX \]
Single Displacement

* Examples:

* \( \text{Mg}(s) + \text{Ag}_3\text{N}(s) \rightarrow \text{Ag}(s) + \text{Mg}_3\text{N}(s) \)

* \( \text{Br}_2(l) + \text{CaI}_2(s) \rightarrow \text{I}_2(g) + \text{CaBr}_2(s) \)
Single Displacement

- Examples:
  - $\text{Mg}_{(s)} + \text{Ag}_3\text{N}_{(s)} \rightarrow \text{Ag}_{(s)} + \text{Mg}_3\text{N}_{(s)}$
  - $\text{Br}_2(l) + \text{CaI}_2(s) \rightarrow \text{I}_2(g) + \text{CaBr}_2(s)$
**Double Displacement**

* Involves two compounds as reactants. When elements in different compounds displace each other.

* General Equation

\[ AX + BY \rightarrow BX + AY \]
**Double Displacement**

**Examples:**

* \( \text{PbNO}_3(s) + \text{KI}(s) \rightarrow \text{K}_2\text{NO}_3(s) + \text{PbI}_2(s) \)

* \( \text{NaBr}(l) + \text{MgI}_2(s) \rightarrow \text{MgBr}_2(l) + \text{NaI}(s) \)