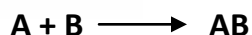


## Types of Changes(Chemical Changes)



Following are the main types of chemical change:

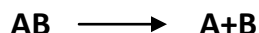
**1. Synthesis or Combination:** Two or more pure substances (elements or compounds) combine to form a new substance. The generic synthesis formula is:



**Example:**  $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$



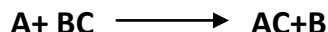
**2. Decomposition:** One pure substance breaks down into two or more other pure substances. The generic formula is:



**Example:**  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$



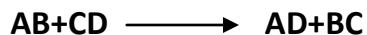
**3. Displacement:** A more reactive metal replaces a less reactive metal, or a reactive nonmetal replaces a less reactive nonmetal in a compound. A single replacement generic formula is:



**Example:**  $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$



**4. Double-displacement:** Two different negative and positive ions from two ionic compounds replace one another. Generically, double replacement is shown as:



**Example:**  $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$

## Types of Changes(Chemical Changes)



**5. Precipitation:** Forming an insoluble solid in a solution is a precipitation reaction.

- The reactants are soluble, but the product formed would be insoluble and separates out as a solid.
- The chemical equation by which a chemical change is described is adequate for reaction in solutions, but for reactions of ionic compounds in aqueous solution (water), the typical molecular equation has different representations.
- A molecular equation may indicate formulas of reactants and products that are not present and eliminate completely the formulas of the ions that are the real reactants and products.
- If the substance in the molecular equation that is actually present as dissociated ions are written in the form of their ions, the result is an ionic equation.



**Example:**  $\text{NaCl(s)} \rightarrow \text{Na}^+ \text{(aq)} + \text{Cl}^- \text{(aq)}$



**6. Neutralization Reaction:** This type of double- displacement reaction between acids and bases neutralizes both the acid and base, producing water and salt. In a neutralization reaction, there is a combination of  $\text{H}^+$  ions and  $\text{OH}^-$  ions which form water. A neutralisation reaction is generally an acid-base neutralization reaction.

