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:

$$A + B \longrightarrow AB$$

Example: $2Na + Cl_2 \rightarrow 2NaCl$

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

$$AB \longrightarrow A+B$$

Example: $CaCO_3 \rightarrow CaO + CO_2$

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:

$$A + BC \longrightarrow AC+B$$

Example: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

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

$$AB+CD \longrightarrow AD+BC$$

Example: $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

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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.

A + Soluble salt B ⟶ Precipitate + Soluble salt C

Example: **NaCl(s) → Na + (aq) + Cl – (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 H+ ions and OH– ions which form water. A neutralisation reaction is generally an acid-base neutralization reaction.

Acid+ Base ⟶ Salt+ Water