

The Main Types of Chemical Reactions

A chemical reaction may be regarded as the process that occurs when matter undergoes change in composition. To be able to understand chemical reaction, one needs to recognize the key types of reactions. Reaction may be classified in several different ways, namely:

Synthesis (Combination) Reactions; Decomposition Reactions; Substitution (single replacement) Reactions; Precipitation (Double replacement) Reaction; Neutralization (acid-base) Reactions; Redox (Reduction and Oxidation) Reactions;

Type of Reaction	Explanation	General Equation (General form change occurrences)	Example
Synthesis/ Combination	Reaction in which two or more simpler substances (elements) combine chemically to give a compound.	$A + B \longrightarrow AB$	$2H_2 + O_2 \longrightarrow 2H_2O$
Decomposition	Reaction in which a compound is broken down into simpler substances (elements).	$AB \longrightarrow A + B$	$2H_2O \longrightarrow 2H_2 + O_2$
Substitution (Single replacement)	Reaction in which an atom or group of atoms is replaced by another atom or group.	$A + BC \longrightarrow AC + B$ OR $A + BC \longrightarrow BA + C$	$Zn + HCl \longrightarrow ZnCl_2 + H_2$ OR $Cl_2 + 2NaBr \longrightarrow 2NaCl + Br_2$
Precipitation (Double replacement)	Reaction in which solid compound is formed when solution of two soluble compounds are mixed.	$AB + CD \longrightarrow AD + CB$	$AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$
Neutralization (acid-base)	Reaction in which an acid reacts with a base to give salt and water.	$HA + BOH \longrightarrow H_2O + BA$	$HCl + NaOH \longrightarrow H_2O + NaCl$
Redox (Reduction-Oxidation)	Reaction which electron transfer occurs.	Reduction: $A^+ \longrightarrow A + e^-$ Oxidation: $B + e^- \longrightarrow B^-$	$Cl_2 + 2e^- \longrightarrow 2Cl^-$ (gain electrons) $2Na \longrightarrow Na^+ + 2e^-$ (loss electrons) $2Na + Cl_2 \longrightarrow NaCl$