

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 reactions, one needs to recognize the key types of reactions. Reactions may be classified in several different ways, namely:

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

Type of Reaction	Explanation	General Equation (General form of change occurrences)	Example
Synthesis/ Combination	Reaction in which two or more simpler substances (elements) combine chemically to give a compound.	$A + B \rightarrow AB$	$2H_2 + O_2 \rightarrow 2H_2O$
Decomposition	Reaction in which a compound is broken down into simpler substances (elements).	$AB \rightarrow A + B$	$2H_2O \rightarrow 2H_2 + O_2$
Substitution (Single replacement)	Reaction in which an atom or group of atoms is replaced by another atom or group.	$A + BC \rightarrow AC + B$ OR $A + BC \rightarrow BA + C$	$Zn + 2HCl \rightarrow ZnCl_2 + H_2$ OR $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$
Precipitation (Double replacement)	Reaction in which a solid compound is formed when solutions of two soluble compounds are mixed.	$AB + CD \rightarrow AD + CB$	$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
Neutralisation (Acid- Base)	Reaction in which an acid reacts with a base to give salt and water.	$HA + BOH \rightarrow H_2O + BA$	$HCl + NaOH \rightarrow H_2O + NaCl$
Redox (Reduction- Oxidation)	Reaction in which electron transfer occurs.	Reduction: $A \rightarrow A + e^-$ Oxidation: $B + e^- \rightarrow B^-$	$aCl_2 + 2e^- \rightarrow 2Cl^-$ (gain electrons) $Na \rightarrow Na^+ + e^-$ (loss of electrons) $2Na + Cl_2 \rightarrow 2 NaCl$