

Competitive Exams: Oxidation and Reduction

Oxidation and Reduction

- Removal of hydrogen atom is oxidation while addition of hydrogen atom is reduction.
- Addition of oxygen atom is oxidation while removal of oxygen atom is reduction.
- Increase in valence of an element is oxidation while decrease in valence of an element is reduction.
- Addition of an electronegative element is oxidation and removal is reduction.
- Loss of electrons is oxidation and gain of electrons is reduction.
- Increase in oxidation number is oxidation while decrease in oxidation number is reduction.

Oxidizing and Reducing Agents

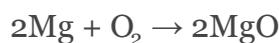
- Compounds having higher oxidation number will be more acidic and act as oxidizing agent and compounds having lower oxidation number will be less acidic and act as reducing agent.
- Generally, compounds with oxygen atom are called oxidizing agent and compounds with hydrogen atom are called reducing agent.
- H_2O_2 acts as a reducing agent when it is oxidized to O_2 or O_3 .
- H_2S acts as a reducing agent when it is oxidized to sulphur.
- Halogens act as oxidizing agent and they are reduced to halogen acids.

Chemical Changes/Reactions in Chemistry

Combination Reaction

Combination reaction occurs when two substances unite to form a third substance.

For example, combining magnesium (Mg) and oxygen (O_2) result in the production of magnesium oxide (MgO)

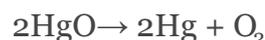


Decomposition Reaction

Decomposition reaction occurs when a single compound breaks down into two or more simpler substances.

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In the decomposition of mercuric oxide (HgO), the elements mercury (Hg) and oxygen (O₂) are produced



Displacement Reaction

When one element replaces another in a compound, it is known as a displacement reaction.

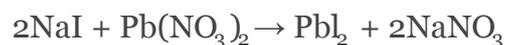
For example, iron (Fe) may displace copper (Cu) in a solution of cupric sulphate (CuSO₄)



Double Decomposition Reaction

When two compounds interact to form two other compounds, it is known as a double decomposition reaction.

For example, sodium iodide (NaI) and lead nitrate (Pb(NO₃)₂) react to form lead iodide (PbI₂) and sodium nitrate



Hydrolysis

Hydrolysis is a double decomposition reaction in which water reacts with a second substance.

When ammonium chloride (NH₄Cl) is combined with water (H₂O), it undergoes hydrolysis, yielding ammonium hydroxide (NH₄OH) and hydrochloric acid (HCl).

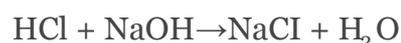


Neutralization Reaction

Neutralization is the interaction of an acid with an equivalent quantity of a base.

If the process is carried out in an aqueous solution (dissolved in water), the products are water and a salt.

For example, hydrochloric acid (HCl) and sodium hydroxide (NaOH) neutralize each other when dissolved in water, forming sodium chloride (NaCl), a salt, and water



Substitution Reaction

Substitution reaction occurs when an element, such as chlorine (Cl), replaces one or more hydrogen atoms in a hydrocarbon, such as methane (CH₄)

