

REDOX REACTIONS**CLASSICAL IDEA OF REDOX REACTIONS &
OXIDATION AND REDUCTION REACTIONS****1. CLASSICAL CONCEPT OF OXIDATION REDUCTION**

- A. Oxidation:** According to this concept, oxidation is considered as the addition of oxygen or removal of hydrogen in an ion, in a compound or in a species. Or the addition of an electronegative element or removal of electropositive element, in an ion, in a species or in a compound is called oxidation.

For example:

- (a) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ → Addition of Oxygen.
- (b) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- (c) $\text{H}_2\text{S} + \text{Cl}_2 \rightarrow 2\text{HCl} + \text{S}$ → Removal of Hydrogen
- (d) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$

- B. Reduction:** According to this concept, reduction is considered as addition of hydrogen or removal of oxygen atom, in an ion, in a species or in a compound. Or addition of an electropositive element or removal of an electronegative element, in an ion, in a species or in a compound is called reduction.

For example:

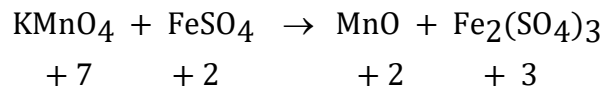
- (a) $\text{H}_2\text{S} + \text{Cl}_2 \rightarrow 2\text{HCl} + \text{S}$
→ Addition of Hydrogen
- (b) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
- (c) $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$
→ Removal of Oxygen
- (d) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$

2. OXIDATION NUMBER CONCEPT OF OXIDATION-REDUCTION

- A. Oxidation:** According to this concept, increase in oxidation no. in an element in a reaction is called oxidation.

- B. Reduction:** According to this concept, decrease in oxidation no. in an element in a reaction is called reduction.

For example:



◆ **OXIDANT OR OXIDISING AGENT**

Species, which oxidize other species, which is present in a reaction and reduce it self. This type of species is called oxidant or oxidising agent. Or species, which accepts electron in a reaction by another species and show decreases in its oxidation no. in the reaction is called oxidant or oxidising agent.

◆ **Some Important oxidising agent or oxidant**

1. All elements with high electronegative character like N, O, F, Cl, etc.
2. All metallic oxides like Li₂O, Na₂O, Na₂O₂, CaO, MgO, BaO₂ etc.
3. Some nonmetallic oxides like CO₂, SO₂, H₂O₂, O₃.
4. All neutral compound or ion in which element shows their higher oxidation no. or state are act as oxidant or oxidising agent like KMnO₄, H₂SO₄, SnCl₄, H₃PO₄, K₂Cr₂O₇, HClO₄, CuCl₂, HNO₃, H₂SO₅, FeCl₃, HgCl₂, etc.

Reductant OR Reducing agent

Species which reduce other element in a reaction and oxidize itself to donate electrons and show increase in its oxidation no. is called reductant or reducing agent.

Some Important reducing agent or reductant

1. All metals like, K, Mg, Ca, etc.
2. All metallic hydrides like NaH, CaH₂, LiAlH₄, NaBH₄, AlH₃, etc.
3. All hydracids like HF, HCl, HBr, H₂S etc.
4. Some organic compounds like Aldehyde, formic acid, oxalic acid, tartaric acid.
5. All neutral compounds or ions, which show their lower oxidation state.

MnO, HClO, HClO₂, H₃PO₂, HNO₂, H₂SO₃, FeCl₂, SnCl₂, Hg₂Cl₂, CH₂Cl₂ etc.

Some Important compound which can act as oxidant and reductant both

HNO₂, SO₂, H₂O₂, O₃, Al₂O₃, CrO₂, MnO₂, ZnO, CuO,

NOTE: Al₂O₃, CrO₂, MnO₂, ZnO, CuO are called as amphoteric oxide.