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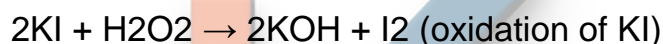
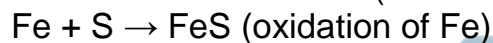
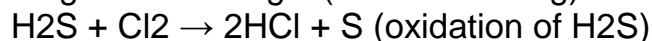


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Oxidation & Reduction

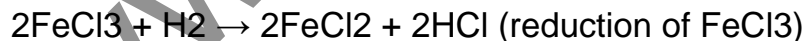
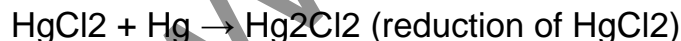
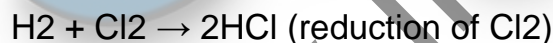
Oxidation (old concept) : Oxidation is a process which involves either of the following—

- (i) addition of oxygen
- (ii) removal of hydrogen
- (iii) addition of electro negative element or group
- (iv) removal of electro positive element or group.

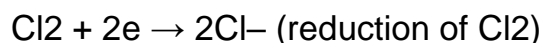
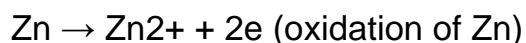
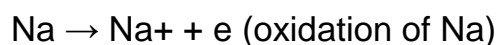


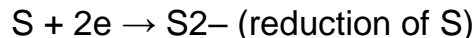
Reduction (old concept) : Reduction is a process which involves either of the following—

- (i) addition of hydrogen (ii) removal of oxygen
- (iii) addition of electro positive element or group.
- (iv) removal of electronegative element or group.

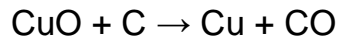


Modern concept of oxidation and Reduction : According to modern concept, loss of electrons is called oxidation whereas gain of electrons is called reduction.





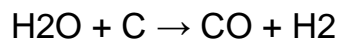
Oxidising agent (O.A.) : A substance which undergoes reduction is called oxidising agent



Oxidation – C, Reduction – CuO, Oxidising agent – CuO

Examples—O₂, O₃, H₂O₂, KMnO₄, K₂Cr₂O₇ etc.

Reducing agent (R.A.) : A substance which undergoes oxidation is called reducing agent.

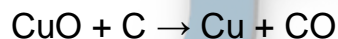


Oxidation— C, Reduction— H₂O, Reducing agent— C

Examples— H₂, CO, H₂S, SO₂, C, SnCl₂ etc.

Redox Reaction : A reaction in which both oxidation and reduction takes place simultaneously is called redox reaction.

Example—



Oxidation – C, Reduction – CuO

Oxidation number (O.N.) : The charge present on atom in molecule or ion is called oxidation number. It may be zero, positive or negative.

Rules for determination of oxidation number :

- (i) Oxidation number of an atom in free state is zero.
- (ii) Oxidation number of alkali metals (Li, Na, K, Rb, Cs) in molecule is always +1.
- (iii) Oxidation number of alkaline earth metals (Be, Mg, Ca, Sr, Ba) in a molecule is always + 2
- (vi) Sum of Oxidation number of atoms in a molecule is equal to zero.

(vii) Sum of oxidation number of atoms in a ion is equal to magnitude of charge with sign.

Oxidation Number of Mn in KMnO_4 :

Let O.N. of Mn = x

$$1 + x + (-2) \times 4 = 0$$

$$1 + x - 8 = 0$$

$$x = +7$$

Oxidation Number of Cr in $\text{K}_2\text{Cr}_2\text{O}_7$:

Let O.N. of Cr = x

$$1 \times 2 + x \times 2 + (-2) \times 7 = 0$$

$$2 + 2x - 14 = 0$$

$$x = 6$$

Oxidation Number of C in $\text{C}_{12}\text{H}_{22}\text{O}_{11}$:

Let O.N. of C = x

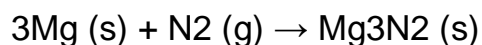
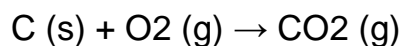
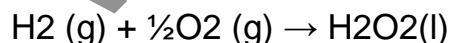
$$x \times 12 + 1 \times 22 + (-2) \times 11 = 0$$

$$12x + 22 - 22 = 0$$

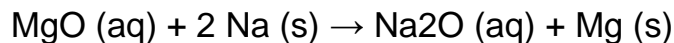
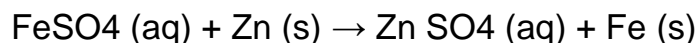
$$x = 0$$

Types of Reactions :

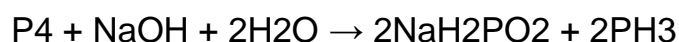
1. Combination reactions : In combination reactions, compounds are formed as a result of the chemical combination of two or more elements.



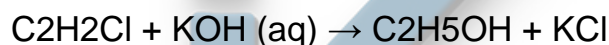
2. Displacement reactions : In these reactions, an atom / ion present in a compound gets replaced by an atom / ion of another element.



3. Disproportionation reactions : The chemical reaction in which only one substance is oxidised as well as reduced simultaneously is called disproportionation reaction.



4. Substitution reaction : In these reactions, one or more atoms or groups present in organic molecule get substituted or replaced by suitable atoms or groups.



Ethyl chloride Ethyl alcohol

5. Neutralisation reaction : When an acid reacts with a base, salt and water is formed. This reaction is called neutralisation reaction.

