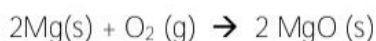


## CHEMICAL REACTIONS AND EQUATIONS

### GIST OF THE LESSON

- 1) Chemical reaction— Chemical changes or chemical reactions are the changes in which one or more new substances are formed.
- 2) Chemical Equations – Representation of a chemical reaction in terms of symbols and formulae of the reactants and products is known as chemical equation.
- 3) Balanced Chemical equations – The chemical equation in which the no. of atoms of different elements is same on both sides of the arrow is called balanced chemical equation.
- 4) The chemical reactions can be classified into different types such as—
  - a) Combination reaction – The reactions in which two or more substances combine to form a new substance are called combination reaction. For example,



- b) Decomposition reaction - The reaction in which a single compound breaks up into two or more simpler substances are called decomposition reactions. For example,



The decomposition of a substance by passing electric current through it is known as electrolysis.

The decomposition of a substance on heating is known as thermal decomposition.

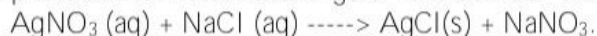
The decomposition of a substance by absorbing light energy is called photochemical decomposition.

- c) Displacement reactions -The chemical reactions in which a more reactive element displaces a less reactive element from a compound are known as displacement reactions. For example,
    - i)  $\text{Zn(s)} + \text{CuSO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{Cu(s)}$ .
    - ii)  $\text{Cu(s)} + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2(\text{aq}) + 2\text{Ag(s)}$ .
  - d) Double Displacement Reactions - The chemical reactions in which compounds react to form two different compounds by mutual exchange of ions are called double displacement reactions.

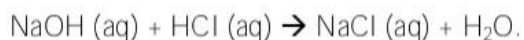
These reactions take place in solution two common types of this reaction are precipitation reactions and neutralization reactions

- i) Precipitation reaction : In this reactions, aqueous solution of two salts are mixed whereby

Some salts precipitate due to mutual exchange of ions between the two salts. For example



- ii) Neutralization reaction: In this type of reaction an acid reacts with a base to form salt and water by exchange of ions.



## Common Ion List

### Exam 1

$\text{CN}^-$	cyanide ion
$\text{NO}_3^-$	nitrate ion
$\text{OH}^-$	hydroxide ion
$\text{CH}_3\text{COO}^-$	acetate ion
$\text{PO}_4^{3-}$	phosphate ion
$\text{SO}_4^{2-}$	sulfate ion
$\text{CO}_3^{2-}$	carbonate ion
$\text{NH}_4^+$	ammonium ion
$\text{H}^+$	hydrogen ion (proton)
$\text{Li}^+$	lithium ion
$\text{Na}^+$	sodium ion
$\text{K}^+$	potassium ion
$\text{Mg}^{+2}$	magnesium ion
$\text{Ca}^{+2}$	calcium ion
$\text{Sr}^{+2}$	strontium ion
$\text{Al}^{+3}$	aluminum ion
$\text{F}^-$	fluoride ion
$\text{Cl}^-$	chloride ion
$\text{Br}^-$	bromide ion
$\text{I}^-$	iodide ion
$\text{O}^{2-}$	oxide ion
$\text{S}^{2-}$	sulfide ion
$\text{N}^{3-}$	nitride ion

### Exam 2

$\text{Sn}^{+2}$	tin(II) or stannous ion
$\text{Sn}^{+4}$	tin(IV) or stannic ion
$\text{Pb}^{+2}$	lead(II) or plumbous ion
$\text{Pb}^{+4}$	lead(IV) or plumbic ion
$\text{Fe}^{+2}$	iron(II) or ferrous ion
$\text{Fe}^{+3}$	iron(III) or ferric ion
$\text{Cu}^+$	copper(I) or cuprous ion
$\text{Cu}^{+2}$	copper(II) or cupric ion
$\text{Zn}^{+2}$	zinc ion
$\text{Ag}^+$	silver ion
$\text{Au}^+$	gold(I) ion
$\text{Au}^{+3}$	gold(III) ion
$\text{H}^-$	hydride ion
$\text{NO}_2^-$	nitrite ion
$\text{HPO}_4^{2-}$	hydrogen phosphate ion
$\text{PO}_3^{3-}$	phosphite ion
$\text{SO}_3^{2-}$	sulfite ion
$\text{HSO}_4^-$	hydrogen sulfate or bisulfite ion
$\text{HCO}_3^-$	hydrogen carbonate or bicarbonate

### Exam 3

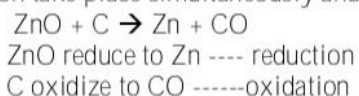
$\text{Mn}^{+2}$	manganese(II) ion
$\text{Co}^{+2}$	cobalt(II) or cobaltous ion
$\text{Co}^{+3}$	cobalt(III) or cobaltic ion
$\text{Cr}^{+3}$	chromium(III) ion
$\text{Cr}^{+6}$	chromium(VI) ion
$\text{Hg}_2^{+2}$	mercury(I) or mercurous ion
$\text{Hg}^{+2}$	mercury(II) or mercuric ion
$\text{O}_2^{2-}$	peroxide ion
$\text{CrO}_4^{2-}$	chromate ion
$\text{Cr}_2\text{O}_7^{2-}$	dichromate ion
$\text{MnO}_4^-$	permanganate ion
$\text{SCN}^-$	thiocyanate ion
$\text{HS}^-$	hydrogen sulfide ion
$\text{ClO}^-$	hypochlorite ion
$\text{ClO}_2^-$	chlorite ion
$\text{ClO}_3^-$	chlorate ion
$\text{ClO}_4^-$	perchlorate ion

e) Redox reaction: Chemical reaction which shows both oxidation and reduction reaction.

Oxidation: Reaction that involves the gain of oxygen or loss of hydrogen.

Reduction: Reaction that shows the loss of oxygen or gain of hydrogen.

Both oxidation and reduction take place simultaneously and hence called redox reaction.

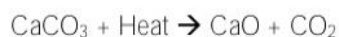


f) Exothermic reaction and endothermic reaction: On the basis of energy changes during chemical reaction, they can be classified as

i) Exothermic reaction: A chemical reaction in which heat energy is produced.



ii) Endothermic reaction: A chemical reaction in which heat energy is absorbed.



5 Corrosion – The process of slow conversion of metals into their undesirable compounds due to their reaction with oxygen, water, acids, gases etc. present in the atmosphere is called corrosion.

Rusting – Iron when reacts with oxygen and moisture forms red substance called rust.

6 Rancidity – The taste and odour of food materials containing fat and oil changes when they are left exposed to air for long time. This is called rancidity. It is caused due to oxidation of fat and oil present in food material.

It can be prevented by using various methods such as by adding antioxidants to the food materials, Storing food in air tight container and by flushing out air with nitrogen.



# MIND MAP

