METALS & NON-METALS

Electrostatic force of attraction due to which positively & negatively charged ions are bonded with each other is known as ionic bond.

Compound containing ionic bonds is known as ionic compound e.g. NaCl, MgO etc.

Ionic bond

Definition

Example : formaion of NaCl

$Na^+ + Cl^- \longrightarrow [Na]^+[:\ddot{Cl}:]^-$ or NaCl

Ionic compound

Definition

Properties

(i) Consist of ions
(ii) Solid & hard due to strong electrostatic forceof attraction
(iii) Definite crystal structure
(iv) High m.p. & b.p.
(v) Soluble in polar solvents like H_2O
(vi) Brittle nature
(vii) Good conductor of electricity in molten and aqueous state

Reactivity series

Decreasing reactivity

Lithium	Li
Potassium	K
Barium	Ba
Sodium	Na
Calcium	Ca
Magnesium	Mg
Aluminium	Al
Zinc	Zn
Iron	Fe
Nickel	Ni
Tin	Sn
Lead	Pb
Hydrogen	H
Copper	Cu
Mercury	Hg
Silver	Ag
Gold	Au
Platinum	Pt

Chemical properties of non-metal

Reaction with oxygen

Non-metal + Oxygen ⟶ Non-metal oxide

C + O_2 ⟶ CO_2

S + O_2 ⟶ SO_2

Reaction with water

Non-metal + Water ⟶ No reaction

Reaction with dilute acid

Non-metal + Acid ⟶ No reaction

Reaction with salt solution

More reactive Non-metal + Salt ⟶ Less reactive Non-metal + Salt

Cl_2 + KBr(aq) ⟶ Br, + KCl(aq)

Reaction with Hydrogen

Non-Metal + Hydrogen ⟶ Non-Metal hydride

$O_2 + 2H_2 \longrightarrow 2H_2O$

$N_2 + 3H_2 \xrightarrow[Fe,Mo]{Li} 2NH_3$

Physicall properties of metal & non-metal

Non-Metal

- Generally gaseous
- Low m.p. & b.p.
- Brittle
- Generally soft
- Bad conductor of heat & electricity
- Not ductile
- Do not have any lustre
- Not sonorous
- Low density

Metal

- Generally Solid
- High m.p. & b.p.
- Malleable
- Generally hard
- Good conductor of heat & electricity
- ductile
- lustrous
- Sonorous
- High density

Chemical properties of metal

Reaction with oxygen

Metal + Oxygen ⟶ Metal oxide

$4Na + O_2 \longrightarrow 2Na_2O$ (at room temperature)

$2Mg + O_2 \longrightarrow 2MgO$ (heating)

$2Zn + O_2 \longrightarrow 2ZnO$ (Strong heating)

$2Cu + O_2 \longrightarrow 2CuO$ (Prolonged heating)

Reaction with water

Metal + Water ⟶ Metal oxide or Hydroxide + H_2

$2Na + 2H_2O(cold\ water) \longrightarrow 2NaOH + H_2$

$Mg + H_2O(boil\ water) \longrightarrow MgO + H_2$

$Zn + H_2O(steam) \longrightarrow ZnO + H_2$

$3Fe(red\ hot) + 4H_2O(steam) \longrightarrow Fe_3O_4 + 4H_2$

Reaction with dilute acid

Metal + dil. acid ⟶ Salt + Hydrogen

$2Na + 2HCl \longrightarrow 2NaCl + H_2$

$Mg + H_2SO_4 \longrightarrow MgSO_4 + H_2$

Reaction with salt solution

More reactive metal + Salt ⟶ less reactive metal + salt

$Fe + CuSO_4(aq) \longrightarrow Cu + FeSO_4(aq)$

$Fe + ZnSO_4(aq) \longrightarrow$ No reaction

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