11/12/2024
Monday.

METALS AND NON-METALS

PHYSICAL PROPERTIES:

METALS: (Eg: Copper, iron, aluminium, magnesium ... etc).

- Lustre ⇒ shining surface of metals.
- Hardness ⇒ metals are generally hard.
- Malleable ⇒ metals can be beaten into thin sheets
- Ductile ⇒ metals drawn into thin wires.
  → Gold is the most ductile metal
- Metals are good conductors of heat and have high melting points.
  (Best: silver and copper).
  (Poor: Lead and Mercury).
- Sonority ⇒ the sound which metals make when hit with some force.

NON-METALS: (Eg: Carbon, Sulphur, Iodine, Oxygen, Hydrogen ... etc).

Opposites of metals with some exceptions.

- We cannot group elements only on the bases of physical properties, as there are many exceptions:

  - Mercury is a metal which is in the form of liquid at room temperature.
  - Iodine is a non-metal but lustorous.
  - Carbon is a non-metal, it can exist in different forms. Each form is called allotrope.
    - Diamond is the most hardest natural substance and is an allotrope.
  - Graphite is a conductor of electricity.
  - Alkali metals (sodium, potassium) can be cut by knife.

Metals and Non-Metals can be classified more clearly from their chemical properties:

CHEMICAL PROPERTIES OF METALS:

- Metal reacts with air:

Metal + Oxygen → Metal Oxide

Eg:- • $2Cu + O_2 \rightarrow 2CuO$
(copper) (copper (II) oxide).

• $4Al + 3O_2 \rightarrow 2Al_2O_3$
(Aluminium) (Aluminium oxide).

Note: Anodising is a process of forming a thick oxide layer of aluminium.

- Metal reacts with water:

  Metal + Water → Metal oxide + Hydrogen

  Metal oxide + Water → Metal hydroxide.

Eg: • $2K(s) + 2H_2O(l) \longrightarrow 2KOH(aq) + H_2(g)$ + heat energy.

• $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

- Metal reacts with acid:

  Metal + Dilute acid → Salt + Hydrogen.

- Metals reacts with solutions of other metal salts:

  Metal A + Salt soln B → Salt soln A + Metal B.

THE REACTIVITY SERIES:

K	Potassium	Most reactive
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	Reactivity decreases
Fe	Iron	
Pb	Lead	
[H]	[Hydrogen]	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	↓ Least reactive.