CONCEPT MAP

ALKALI METALS

Li, Na, K, Rb, Cs, Fr
Electronic configuration : [Noble gas]ns^1

Properties

Physical properties

- Hydration enthalpy: Li^+ has maximum degree of hydration
- Strongly electro-positive
- Exhibit +1 oxidation state
- I ionisation enthalpy → lowest
- II ionisation enthalpy → very high
- Metallic, soft, tarnished on exposure to air
- Weak metallic bond
- Low melting point and boiling point
- Form ionic compounds
- Li, Na, K - lighter than water
- Flame colouration
  Li - crimson,
  Na - yellow,
  K - pale violet,
  Cs - blue,
  Rb-red violet,
- Exhibit photoelectric effect (except Li)

Chemical properties

- Strong reducing agents in gaseous state :
  Li < Na < K < Rb < Cs
  in aqueous solution:
  Na < K < Rb < Cs < Li
- Vigorous reaction with water (except Li)
- All tarnish in air, forms oxide or hydroxide on the surface
- Ionic hydrides (M^+H^-)
- Vigorous reaction with halogens → ionic metal halides (M^+X^-)
- Dissolve in liq. NH_3 giving highly conducting deep blue solutions
- Hydroxides → strong bases
- Li shows anomalous behaviour and has diagonal relationship with Mg (group 2)

Important compounds

$Na_2CO_3 \cdot 10H_2O$
Sodium carbonate
(Washing soda)

- Manufactured by Solvay-ammonia process.
- Softening hard water, cleaning, paints, soap, glass, petroleum and metal refining, paper and textile industry.
  fusion mixture :
  $Na_2CO_3 + K_2CO_3$

NaCl
Sodium chloride
(Common salt)

- Obtained by evaporation of sea water
- Used in preparation of Na_2CO_3, NaOH and Na_2O_2

NaOH
Sodium hydroxide
(Caustic soda)

- Manufactured by Castner & Kellner's cell or mercury cathode cell
- Used in preparation of soap, paper, rayon, pure fats, oils, dyes, mercerising cotton fabrics petroleum refining

$NaHCO_3$
Sodium hydrogen carbonate
(Baking soda)

- Evolves CO_2 on heating
- Used in fire extinguishers
- Used as antiseptic, antacid, baking powder

Biological importance

- Na^+ : in blood plasma and other interstitial fluids,
- K^+ : inside the cells, important for $Na^+ - K^+$ pump