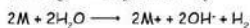
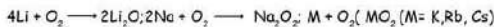


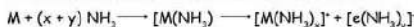
Group 1 Elements (Alkali Metals)

- **Atomic and Ionic Radii:** Increases with increase in atomic number.
- **I.E:** Decreases down the group.
- **Hydration Enthalpy:** Decreases with increase in ionic sizes.
- **Physical Properties:**
 - Silvery White, soft and light metals.
 - Low m.p. and b.p.
 - Alkali metals and their salts impart colour to an oxidizing flame.

Chemical Properties:



React vigorously with halogens to form ionic halides

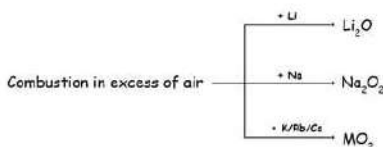


Uses:

- Li is used to make useful alloys.
- Li is used in thermonuclear reactions and making electrochemical cells.
- Na is used to make Na/Pb alloy.
- Liquid Na metal is used as coolant in nuclear reactors.
- KCl is used as fertilizers.
- Cs is used in devising photoelectric cells.

Characteristics of Compound of alkali Metals:

Oxides and Hydroxides



- Alkali metals halides (MX) have high melting, colourless crystalline solids.
- Preparation: Reaction of Oxides, hydroxide or carbonate with aq HX.
- High negative enthalpies of formation.
- Melting and boiling points: $\text{F} > \text{Cl} > \text{Br} > \text{I}$
- Soluble in water.

Salts of Oxo-acids:

- Alkali metals form salts with all oxo-acids.
- Soluble in water and thermally stable.
- Stability of carbonates and hydrogen carbonates increases.

Anomalous properties of Li: Due to

- Exceptionally small size of its atom and ion.
- High polarising power.

Biological Importance of Na and K:

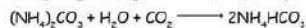
Na ions participate in Nuclear signal transmission, regulator of flow of water across cell membranes. K ions activate many enzymes and oxidation of glucose to produce ATP.

Electronic Configuration

ns^1 : Alkali metals; ns^2 : Alkaline Earth Metals

Important Compound of Sodium:

(i) **Sodium Carbonate (washing Soda):** Preparation : By Solvay process



Properties:

(a) White, crystalline solid.

(b) Readily soluble in water



Uses: Water softening, laundering cleaning, manufacture as laboratory reagent.

(i) **Sodium Chloride (NaCl)**

Preparation:

Crude NaCl by Crystalline of Brine Solution.

Pure NaCl is Obtained by dissolving crude salt in minimum water and filtered to remove insoluble impurities. Solution is saturated with HCl gas.

Uses: As common salt

(ii) **Sodium Hydroxide (NaOH)**

Preparation: By electrolysis of NaCl in Castner-Kellner cell.

Uses: In manufacture of Soaps, paper, petroleum refining.

(iii) **Sodium Hydrogencarbonate (NaHCO₃)**

Preparation: $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2 \longrightarrow 2\text{NaHCO}_3$

Group 2 elements (Alkali Earth Metals)

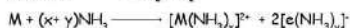
- **Atomic and ionic Radii:** Smaller than corresponding alkali in group, increases with increase in atomic number.
- **I.E:** IE_1 , higher than corresponding group 1 metals.
 IE_2 Smaller than corresponding alkali metals.
- **Hydration Enthalpies:** Decreases with increase in ionic size down the group.

Physical Properties:

- Silvery white, lustrous and relative soft but harder than alkali metals.
- M.P and B.P higher than corresponding alkali metals.
- Electropositive character increases down the group.

Chemical properties:

- Be and Mg are kinetically inert to O and H₂O
- Mg is more electropositive and burns in Air.
- Ca, Sr and Ba with air form oxide and nitride.



Uses:

- Be is used in the manufacture of Alloys
- Metallic Be is used for making windows of X-Rays tubes.
- Mg-Al Alloys are used in air craft construction.
- Ca in extraction of metals.
- Ra is used in radiotherapy.

Characteristics of compounds of Alkali Earth Metals:

Oxides and Hydrides

- Alkaline earth metals burn oxygen to form MO
- All Oxides except BeO are basic in nature.



Be(OH)₂ is amphoteric in nature

Halides:

- Except for Be Halides, all other halide are ionic.
- Tendency to form halide hydrates decrease gradually.
- Salts of Oxoacids: Forms carbonates, sulphates and nitrates.
- Anomalous behavior of Be: Small atomic and Ionic sizes, does not exhibit C.N. More than four, its oxides and hydroxide are amphoteric
- Be shows diagonal relationship with Al

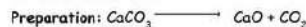
Biological importance of Mg and Ca

All enzymes that utilize ATP in PO₄ transfer requires Mg as cofactor. Chlorophyll contains Mg. Ca is present in bones and teeth. Important in Neuromuscular function, intraneuronal transmission and blood Coagulation

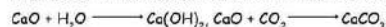
	1	2	13	14	15
period 2	Li	Be	B	C	N
period 3	Na	Mg	Al	Si	P

Important Compound of Calcium

(i) **CaO, Quick Lime**



Properties: White amorphous solid with m.p. 2870K



(ii) **Ca(OH)₂ Calcium Hydroxide:** Preparation : Addition of water to CaO.

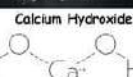
Properties: White Amorphous Powder.



(iii) **CaSO₄ · 1/2H₂O (Plaster of Paris)**



Quick Lime



Calcium Hydroxide



Plaster of Paris