

## s – BLOCK ELEMENTS

In the modern periodic table Group 1 & 2 elements having outer EC.  $ns^1$  and  $ns^2$  are s-block elements.

### n – principal Quantum no. (Bohr)

**Group I** [Alkali metals] – outer EC –  $ns^1$

They are Li, Na, K, Rb, Cs & Fr is radioactive



These elements are known as **alkali metals**, because their compounds are **strong bases** [supply  $\text{OH}^-$  ions in aqueous medium]

But the word originated from an Arabic word Alquili/Alquis  $\rightarrow$  Ashes of plants

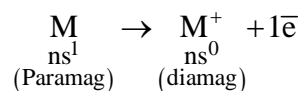
General characteristics :

1. Alkali metals are silvery white, soft metals, they can be cut with a knife.

They have low M.P & B.P due to **weak metallic bonding** [Drude & Lorentz]. But they are good conductors.

2. **Size & Reactivity** : They have biggest size in respective periods & Down the group size increases, **I.E value decreases** (due to screening effect of inner electrons) So they are most reactive elements in P.T.

They have greater tendency to form unipositive ion



I.E

Li = 520 KJ/m

Na = 496

K = 419

Rb = 403

Cs = 376

But Li - exception

Li - mainly form covalent compound due to **high I.E small size & high polarising power** [Fajans rules]

Eg: LiCl, LiBr, LiI

But  $\text{Li}^+\text{F}^-$  ionic [Due to high EN of F]

### Note

LiCl LiBr LiI – soluble in organic solvents **pyridine**, ether, benzene etc

LiF ionic insoluble in water due to **high lattice energy**

### 3. Order of hydration in enthalpy in aq. medium

$\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{Cs}^+$

So LiCl exist as  **$\text{LiCl} \cdot 2\text{H}_2\text{O}$**

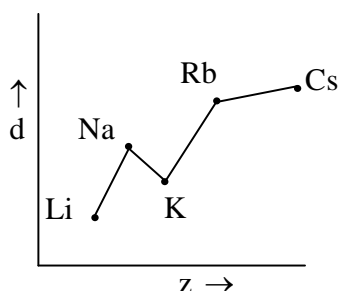
### 4. Alkali metals have low density

$$d = \frac{\text{mass of unit cell}}{\text{Vol. of unit cell}} = \frac{M \times Z}{N_A \times a^3}$$

Lowest 'd' for Li  $\Rightarrow 0.53 \text{ g/cm}^3$

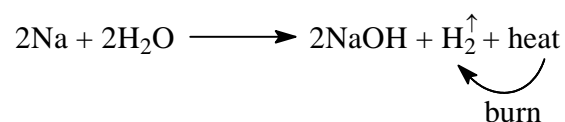
$\text{Li} < \text{K} < \text{Na} < \text{Rb} < \text{Cs}$

0.53 0.86 0.99 1.53 1.9  $\text{g/cm}^3$



### 5. Alkali metals are normally **kept in kerosene**, because very reactive, react with air, $\text{O}_2$ , $\text{CO}_2$ moisture & get **tarnished** in air.

They even catch fire with moisture



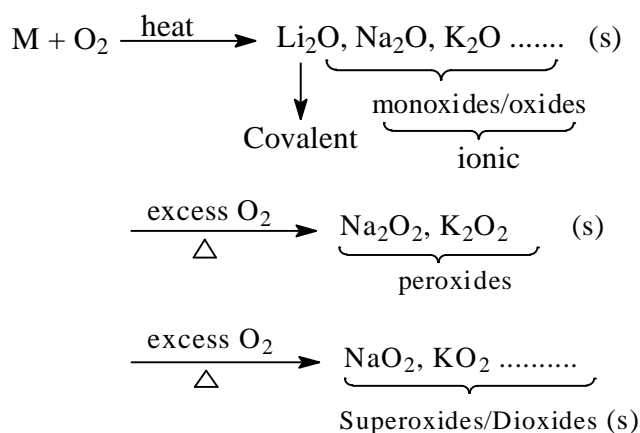
So they are kept in kerosene. But Li – kept in **paraffin wax**

### 6. Alkali metals are powerful reducing agents. They have greater tendency to loss $e^-$ . This is expressed in terms of $E^\circ$ value.

$$E^\circ_{\text{Li}^+/\text{Li}} = -3.05 \text{ V} \quad \text{Application of 'Li'}$$

Chemical Reactions :

### 1. Reaction with air/O<sub>2</sub>

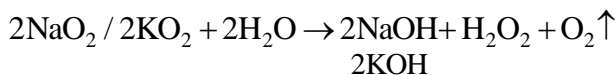
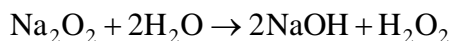
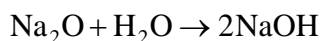


Li has only one oxide Li<sub>2</sub>O – small size & small nuclear charge

Others have large size & **nuclear charge** can form higher oxides.

Most stable oxide – Li<sub>2</sub>O **can't be hydrolysed** (covalent)

But others are **hydrolysed**.



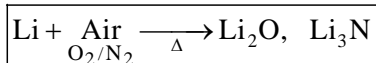
**Use of KO<sub>2</sub>** – Used in breathing apparatus by deep sea divers & mine workers

It react with 'H<sub>2</sub>O' in exhaled air lib – O<sub>2</sub>



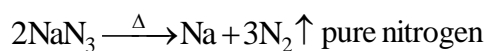
Oxides & peroxides have no colour

Super oxides have yellow/orange colour due to unpaired  $\bar{e}$  in antibonding M.O – paramag.

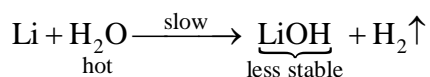
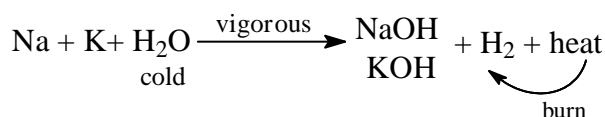


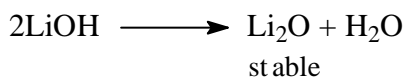
Others have no reaction with N<sub>2</sub> covalent [N<sub>2</sub> – prefer to form covalent] high IE.

But Na<sup>+</sup>N<sub>3</sub><sup>-</sup> sodium azide **ionic**

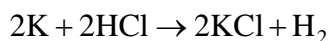
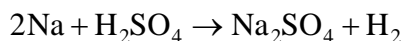
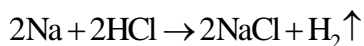


### 2. Reaction with H<sub>2</sub>O

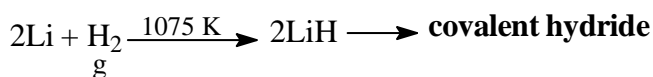
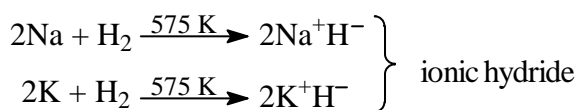




### 3. Reaction with acids

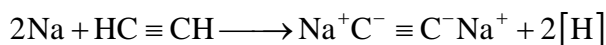
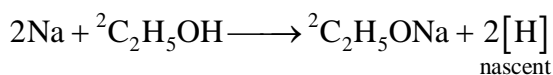


### 4. Reaction with $\text{H}_2$



Order of stability  $\text{LiH} > \text{Na}^+\text{H}^- > \text{K}^+\text{H}^-$

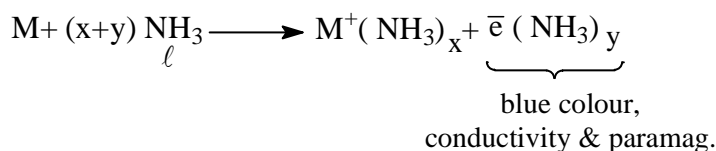
### 5. Reaction with alcohol & Acetylene :-



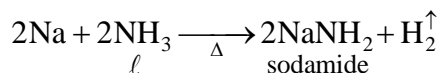
### 6. Reaction with Liq. $\text{NH}_3$

$$\text{Tc} = \frac{8a}{27\text{Rb}}$$

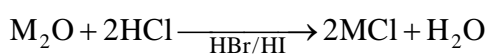
Tc for  $\text{NH}_3$   $132^\circ\text{C} / 405\text{ K}$



Conc. can be increased by adding more **alkali metal** up to **5M**, As conc. **increases** colour blue  $\rightarrow$  **bronze of diamag.** On heating



### 7. Reaction with halogens



for Fluorides, down the group

$$\Delta H_f^0 = \text{less -ve (stability decreases)}$$

**Stability**

$\text{LiF} > \text{NaF} > \text{KF} \dots\dots$

For others  $(\text{Cl}^- / \text{Br}^- / \text{I}^-)$

Down the group  $\Delta H_f^0 =$  more -ve  
(stability increases)

$\text{LiCl} < \text{NaCl} < \text{KCl} \dots\dots\dots$

$\text{LiBr} < \text{NaBr} < \text{KBr} \dots\dots\dots$

**Solubility:-**

1. Almost all MX soluble in  $\text{H}_2\text{O}$   
(hydration enthalpy > lattice enthalpy)
2.  $\text{Li}^+\text{F}^-$  ionic insoluble in  $\text{H}_2\text{O}$   
(lattice enthalpy > hydration enthalpy) strong lattice
3.  $\text{LiCl} / \text{LiBr} / \text{LiI}$  are covalent in soluble in organic solvents  $\rightarrow$  pyridine, ether, alcohol
4.  $\underbrace{\text{Cs}^+\text{I}^-}_{\text{ionic}}$  insoluble in  $\text{H}_2\text{O}$  due to high lattice enthalpy & smaller hydration enthalpy

order of MP & BP :  $\text{MF} > \text{MCl} > \text{MBr} > \text{MI}$

**Note**

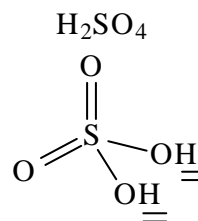
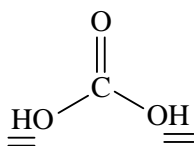
Lithium perchlorate – ionic

$\text{LiClO}_4 \rightarrow$  soluble in  $\text{H}_2\text{O}$  to **greater extent**

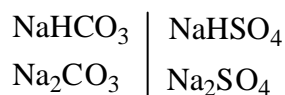
**Salts of oxoacids**

Acids with  $\text{H}^+$  present on  $-\text{OH}$  group, with an oxo group

Carbonic acid  $\text{H}_2\text{CO}_3$



Alkali metals form salts with **oxoacids**



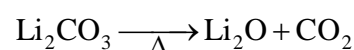
$\text{NaHCO}_3 / \text{Na}_2\text{CO}_3$  are stable towards heat

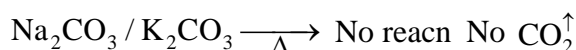
**Note**

As electropositivity of alkali metal increases

Stability of  $\text{HCO}_3^-$  &  $\text{CO}_3^{2-}$  salts increases

$\text{Li}_2\text{CO}_3$  is less stable decompose on heating





$\text{LiHCO}_3$  will not exist solid

But  $\text{NaHCO}_3/\text{KHCO}_3$  exist as solid

### Anomalous nature of 'Li'

- Reasons are
- 1) Small size of Li atom
  - 2) High I.E 520 KJ/m
  - 3) High polarising powers [Fajans' rule]

$$= \frac{\text{ionic charge}}{(\text{ionic radius})^2}$$

### Anomalous properties

1. Li is hardest of alkali metals
2. High MP & BP, but powerful red. agent
3. It can form oxide & nitride  $\text{Li}_2\text{O}$  &  $\text{Li}_3\text{N}$  covalent
4.  $\text{Li}_2\text{O}$  more stable than  $\text{LiOH}$
5. Li-halides are covalent except  $\text{Li}^+\text{F}^-$  ionic
6.  $\text{LiCl}$  is a deliquescent solid  $\text{LiCl} \cdot 2\text{H}_2\text{O}$  – soluble in pyridine, alcohol
7.  $\text{Li}_2\text{CO}_3$  less stable  $\text{Li}_2\text{CO}_3 \xrightarrow{\Delta} \text{Li}_2\text{O} + \text{CO}_2$   
others carbonates are stable even at high temp.
8.  $4\text{LiNO}_3 \xrightarrow{\Delta} 2\text{Li}_2\text{O} + 4\text{NO}_2^{\uparrow} + \text{O}_2$  Reddish brown gas  
but  

$$\begin{array}{ccc} 2\text{NaNO}_3 & \xrightarrow{\Delta} & 2\text{NaNO}_2 + \text{O}_2 \\ 2\text{KNO}_3 & \xrightarrow{\Delta} & 2\text{KNO}_2 + \text{O}_2 \end{array}$$

no brown gas
9. All have solid bicarbonate but Li – does not have solid bicarbonate
10.  $\text{LiF}$  &  $\text{Li}_2\text{O}$  – less soluble in  $\text{H}_2\text{O}$

### Diagonal relation Li → Mg

#### Reasons

1. Similar size /radii
 

$\text{Li} \rightarrow 152 \text{ pm}$	$\text{Mg} = 160 \text{ pm}$
$\text{Li}^+ \rightarrow 76 \text{ pm}$	$\text{Mg}^{2+} = 72 \text{ pm}$
2. EN values are very close
 

$\text{Li} = 1$	$\text{Mg} = 1.2$
-----------------	-------------------
3. Same polarising powers

#### Similarities are

1. Li & Mg – very hard – high MP & BP
2. They form oxide & nitride  $\text{Li}_2\text{O}$ ,  $\text{Li}_3\text{N}$ ,  $\text{MgO}$ ,  $\text{Mg}_3\text{N}_2$
3.  $\text{Li}_2\text{CO}_3$  &  $\text{MgCO}_3$  – unstable  $\xrightarrow{\Delta} \text{CO}_2^{\uparrow}$
4. They have no solid bicarbonate

5.  $\text{LiCl}$  &  $\text{MgCl}_2 \rightarrow$  deliquescent solid  
 $\text{LiCl} \cdot 2\text{H}_2\text{O}$  &  $\text{MgCl}_2 \cdot 8\text{H}_2\text{O}$  – Soluble in org. solvents (pyridine, ethanol)
6. Their nitrate on heating give  $\text{NO}_2$  gas [Reddish brown gas]
7. Their reaction with  $\text{H}_2\text{O}$  very slow
8.  $\text{LiOH}$  &  $\text{Mg}(\text{OH})_2$  – decompose on heating

**Extraction**

Alkali metals can't be extracted by **coke reduction**, they are powerful reducing agents &  $E^0$  value = **-ve sign very high**.

So they are extracted by electrolysis of their fused salts  $\rightarrow$  **Electrolytic reduction**

**Li**:- exist as

1. Spodumene  $\text{LiAlSi}_2\text{O}_6$  — **ore**
2. Lepidolite  $(\text{LiAl})_3 \text{K} \left( \underset{\text{Rb}}{\text{SiAl}} \right)_4 \text{O}_{10} \text{F}(\text{OH})_2$
3. Amblygonite  $(\text{LiNa}) \text{Al}(\text{PO}_4) \text{F}(\text{OH})$

$\text{LiCl}$  prepared from the ore spodumene

$\text{Li}$  – extracted by electrolysis of  $\text{LiCl}$  &  $\text{LiF}$  fused mixture

$\text{Li} \rightarrow$  At cathode

$\text{Cl}_2 \rightarrow$  anode


Uses

1. As a reducing agent
2. For making alloys
3.  $\text{Li-Al}$  alloy for making cutting tools
4.  $\text{Li}$  – used as anode in battery & cells
5.  $\text{Li-Al}$  alloys – used in aircraft industry
6.  $\text{Li-Mg}$  alloy – for making armour plates

**Na**:- exist as

1.  $\text{NaCl}$  – common salt – Rocks salt  $\rightarrow$  **ore**
2.  $\text{NaNO}_3$  – chile saltpeter
3.  $\text{NaSO}_4 \cdot 10\text{H}_2\text{O}$  Glauber salt
4.  $\text{Na}_2\text{SO}_4$  – salt cake
5.  $\text{Na}_3\text{AlF}_6$  – cryolite

$\text{Na} \rightarrow$  extracted by electrolysis in Downs' cell/process

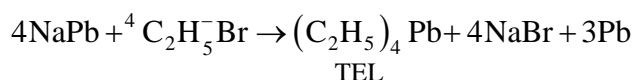
$\text{NaCl}$	$\text{CaCl}_2$	traces
40%	60%	of $\text{KF}$
		
lower MP of $\text{NaCl}$		

$\text{Na} \rightarrow$  at cathode

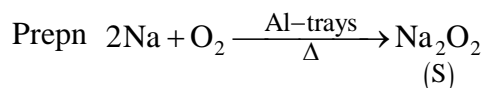
$\text{Cl}_2 \rightarrow$  anode

**Use of Na**

1. NaHg used as reducing agent
2. Na used for preparation of  $\text{Na}_2\text{O}_2$ ,  $\text{NaNH}_2$  &  $\text{NaCN}$
3. Liquid Na - used as coolant in nuclear reactors
4. Liq. Na/K alloy used in high temp thermometer
5. Na - Pb alloy used for preparation of TEL (It was used as antiknocking agent in petrol)



6. Na used for detection of N, S & halogens in organic compounds [Lassaigne's test]

**Compounds of alkali metals****1.  $\text{Na}_2\text{O}_2$  – sodium peroxide → Oxone**

Air free from  $\text{H}_2\text{O}$  &  $\text{CO}_2$       Pure colourless solid

Some times pale yellow colour due to traces of  $\text{NaO}_2$

**Uses**

1. As an Ox. agent
2. As a source of  $\text{CO}_2$  gas → oxone
3. As a bleaching agent
4. As a lab reagent
5. For prepn  $\text{H}_2\text{O}_2$   $\text{Na}_2\text{O}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}_2$  (Merck's process)

**2. NaCl–Rock salt/ Common salt**

Obtained /manufactured by solar evaporation of sea  $\text{H}_2\text{O}$  – NaCl forms

It contains impurities like  $\text{Na}_2\text{SO}_4$ ,  $\text{CaSO}_4$ ,  $\underbrace{\text{MgCl}_2, \text{CaCl}_2}_{\text{deliquescent - solids}}$  - more soluble

So crude NaCl becomes wet on keeping

**Purification :-**

1. Prepare salt soln of NaCl in  $\text{H}_2\text{O}$
2. Pass HCl gas - Due to common ion effect NaCl comes out
3. Filter – Dried by heating & add small amount of  $\text{KIO}_3$  → iodised table salt

**Uses :-**

1. As a taste maker in food stuffs
2. As a food preservative
3. For the prepn of  $\text{NaOH}$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{NaHCO}_3$  etc
4. For extraction of soap (salting out process)
5.  $\text{NaCl} + \text{ice} \rightarrow$  used as freezing mixture



**3. Sodium carbonate**  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O} \rightarrow$  washing soda

$\text{Na}_2\text{CO}_3 \rightarrow$  Soda Ash

**By solvay process** (Ammonia Soda Process)

**Principle**

**Reagents**  $\text{NH}_4\text{OH}$  soln,  $\text{CO}_2$  and Brine (conc  $\text{NaCl}$  soln)

**Process :-**  $\text{CaCl}_2$  biproduct  
Solvay process

**Note :-**

$\text{K}_2\text{CO}_3$  [Pearl Ash] can't be prepd by

Solvay process —  $\text{KHCO}_3$  formed soluble **in medium** can't be filtered. So it prepd by **Le-Blanc process**

$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O} \rightarrow$  **efflorescent salt** – soluble in water

**Uses:-**

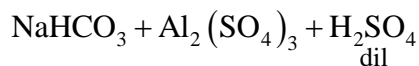
1. As a softening agent for hard water
  2.  $\text{Na}_2\text{CO}_3 + \text{K}_2\text{CO}_3 \rightarrow$  **Fusion mixture**
  3. For quantitative & quantitative analysis in Analytical chemistry
  4. For manufacture of **washing soda** & washing soap
  5. Manufacture glass, paper, borax .....
- $\text{K}_2\text{CO}_3$  – for soft soap & hard glass

**$\text{NaHCO}_3$  – Baking Soda**

1. Prepd by solvay process
  2. Pass excess  $\text{CO}_2$  through  $\text{Na}_2\text{CO}_3$
- $$\text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \underset{\text{excess}}{\text{CO}_2} \rightarrow 2\text{NaHCO}_3 \text{ white solid (Powder)}$$

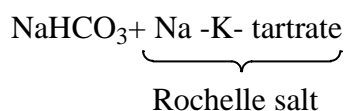
Uses

1. In prepn of Baking powder & Baking soda
2. Used in medicine – Antacid
3. in fire extinguisher –  $\text{NaHCO}_3$  + Sand – Dry powder



Foamite oil fire extinguisher

4. **As antiseptic**
4. As antiseptic powder – seidlitz powder – for skin infection



**NaOH – Castic Soda**

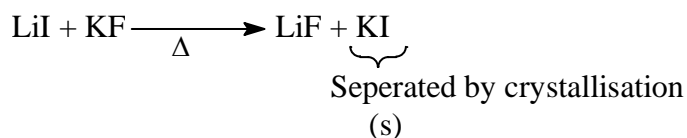
1. Castner Kellner process  
Brine electrolysed  $\text{H}_2$  &  $\text{Cl}_2$  + NaOH white deliquescent (translucent)
2. Nelson cell/ Diaphragm cell
3. Nafion membrane cell MP 591 K  
Co-polymer – tetrafluoroethylene & perfluoro sulphonyl vinyl ether  
When exposed  $\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3$

**Uses of NaOH**

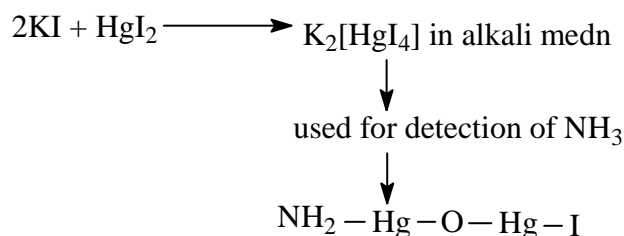
1. As a lab reagent
2. In the manufacture Dyes & Drugs
3. For purification of Borne ore of Al ( $\text{Al}_2\text{O}_3$ )
4. Manufacture of soap, silk, paper
5. Prepn of pure fats & oils
6. For Mercerizing cotton – in textile industry

**Biological Importance Na & K**

1.  $\text{Na}^+$  ion blood plasma – for transmission of nerve signals
2. Regulate transport of sugars and amino acids into cells
3.  $\text{K}^+$  ions in cell fluids activate enzymes  
oxdn – glucose to  $\rightarrow$  ATP  
 $\text{Na}^+$  &  $\text{K}^+$  present in cell membrane /blood plasma – control amount of ATP

**KI** prepd from sea water

1. As a lab reagent
2. For prepn of dyes & drugs
3. For prepn of Nessler's reagent

**Group –2** [Outer EC – $\text{ns}^2$ ]

Be, Mg, Ca, Br, Ba &amp; Ra

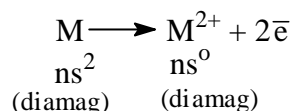
$$\text{Ra} = t_{1/2} = 1600 \text{ years approx}$$

All except Be - are alkaline earth, because Be - rare & its compounds are **amphoteric**

But compounds of others are basic, less basic than group -1

**They exist in earth as  $\text{CO}_3^{2-}$  &  $\text{SO}_4^{2-}$**

1. Atomic size /radn less than group -1. So high I.E  
Down group size increases IE decreases  
I.E, Be - 899 KJ/, Mg = 737, Ca = 590, Sr = 549, Ba = 503  
 $\text{IE}_2 < \text{IE}$  value of alkali metals
2. They form dipositive ion



But Be – **exception** small size, high IE, high polarising power

Be form covalent compounds  **$\text{BeCl}_2$**

**$\text{BeF}_2$**  – ionic & soluble in water

due to hydration enthalpy  $\text{Be}^{2+}$  high

3. Hydration enthalpy group 2 > group 1  
So compounds /salts are hydrated  $\text{Be}^{2+} > \text{Mg}^{2+} > \text{Ca}^{2+} \dots > \text{Ba}^{2+}$   
 $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ,  $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$  ..... etc
4. They are weaker red. agents than group -1. due to high IE
5. They have strong metallic bonds. So high MP & BP
6. They have higher densities & harder than group -1

$$\text{Be} = 1.85 \text{ gm/cm}^3$$

$$\text{Mg} = 1.74$$

$$\text{Sr} = 2.63$$

Lowest density

$$\text{Ca} = 1.55$$

$$\text{Ba} = 5.6$$

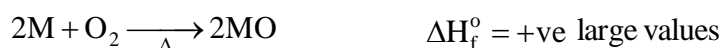
## 7. Flame colouration

Be & Mg will not give colour to the flame due to high I.E.  $\bar{e}$  are strongly attracted by nucleus to excite in the flame.

Ca – Brick red, Sr – Crimson, Ba – Pale green / Apple green

## Chemical Reactions

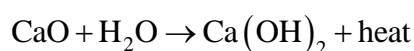
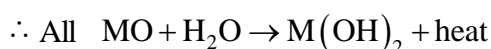
### 1. Reaction with air

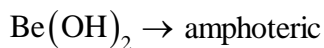


So thermodynamically unstable

$\text{BeO}$  — Amphoteric oxides

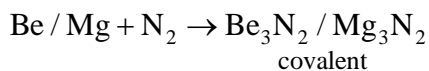
$\text{Mg}$ ,  $\text{CaO}$  ---> basic oxides



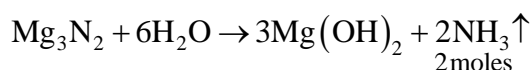


### Order of basic

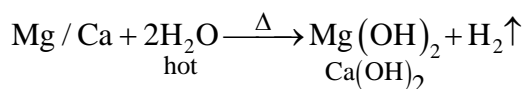
$\text{Mg}(\text{OH})_2 < \text{Ca}(\text{OH})_2 < \text{Sr}(\text{OH})_2 < \text{Ba}(\text{OH})_2 \rightarrow$  solubility in  $\text{H}_2\text{O}$  increases  
 hydra enthalpy same, lattice enthalpy decreases



### Use

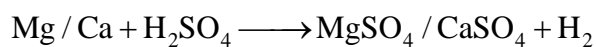
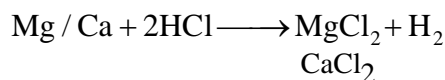


## 2. Reaction with $\text{H}_2\text{O}$

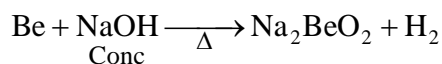


But Be – no reaction with  $\text{H}_2\text{O}$  even at high temp.

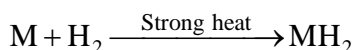
## 3. Reaction with acids



Be has no reaction with Acid, But Be -react with base



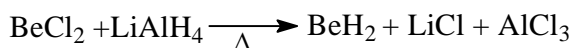
## 4. Reaction with $\text{H}_2$



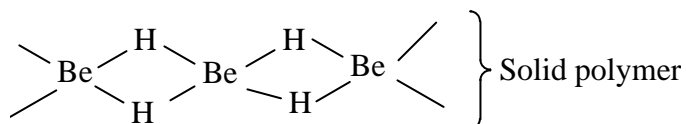
$\text{BeH}_2 \rightarrow$  covalent                      all others ionic

$\text{CaH}_2 \rightarrow$  Hydrolith (used for prepn of  $\text{H}_2$ )

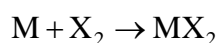
Stru. of  $\text{BeH}_2$ / prepn

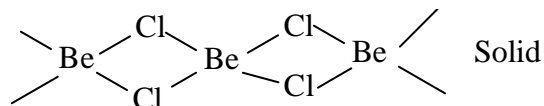
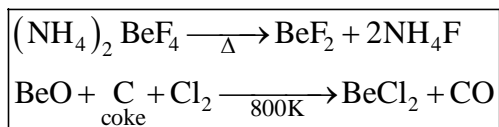


↓  
 exist as  $(\text{BeH}_2)_n$  polymeric  
 with bridge bond

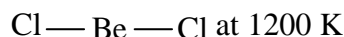


## 5. Reaction with $\text{X}_2$

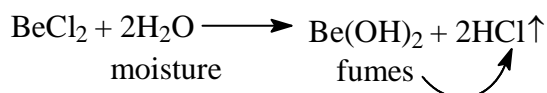
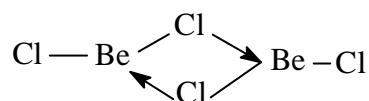




In vapour



But below 1200 K  $\text{BeCl}_2$  exist as dimer

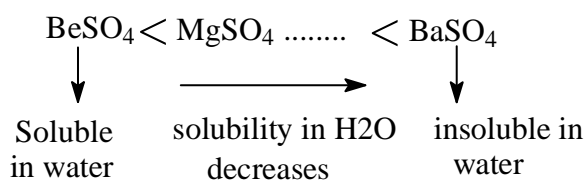
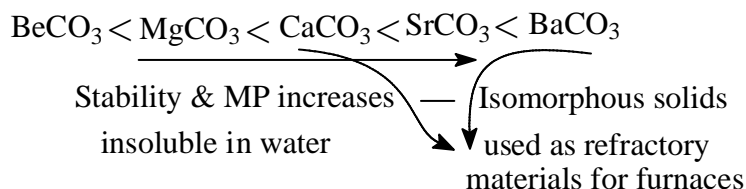


$\text{CaCl}_2$ ,  $\text{MgCl}_2$  - used as drying agent

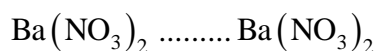
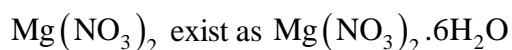
## 6. Reaction with liquid $\text{NH}_3$

Same as alkali metals

## 7. Order of stability of $\text{CO}_3^{2-}$ & $\text{SO}_4^{2-}$ (Oxosalts)

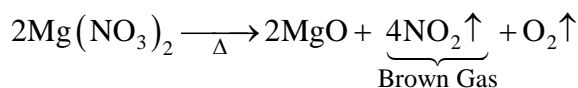


## Nitrates



→ hydration enthalpy decreases

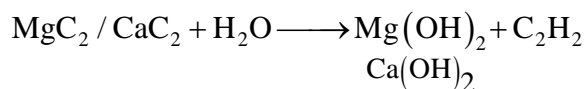
All nitrates decompose on heating



**Anomalous nature of Be**

**Reasons :-** Small size, high IE, high EN & no 'd' orbitals properties

1. Its oxide & hydroxide – amphoteric
2. It has no reaction with  $H_2O$
3. It has no reaction with acid, but react with base
4.  $BeCO_3$  – thermally unstable
5.  $Be_2C + 4H_2O \longrightarrow 2Be(OH)_2 + CH_4$



6. Be – has maximum co-ordination no - 4 – no d orbitals

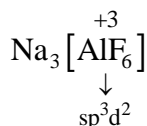
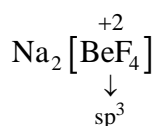
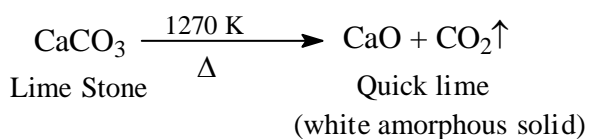
Be  $\rightarrow$  Al diagonal relations

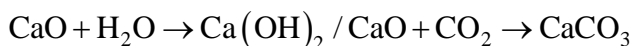
1. Similar size,
2. EN values same,
3. Same polarising power
1. Their oxide & hydroxide are amphoteric
2. No reaction with  $H_2O$
3. They react with base – lib. hydrogen [Be – no reaction with acid - due to oxide coating]
4.  $Be_2C$  &  $Al_4C_3 + H_2O \rightarrow CH_4$
5.  $BeCl_2$  &  $AlCl_3$  exist as dimer in vap.state
6.  $BeO$  &  $Al_2O_3 \rightarrow$  dissolve in excess of  $NaOH$
7.  $Be_3N_2$  &  $AlN + H_2O \rightarrow NH_3 \uparrow$
8. They become passive in con. $HNO_3$  – oxide coating

**Difference**

Be – maximum co-ordination = 4

Al – co-ordination no = 6

**Compounds of Ca & Mg****1. CaO quick lime**



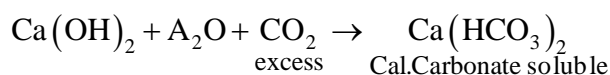
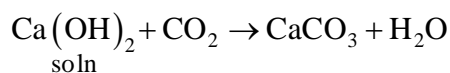
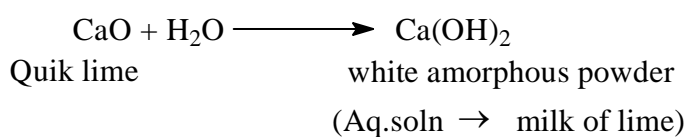
### CaO – Basic oxide



### Use

1. Manufacture of cement
2. Manufacture of  $\text{Na}_2\text{CO}_3$ , dyes
3. Purification of sugar

### 2. $\text{Ca}(\text{OH})_2$ – slaked lime

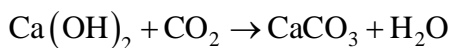


### Uses $\text{Ca}(\text{OH})_2$

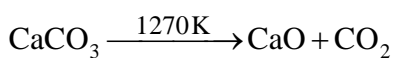
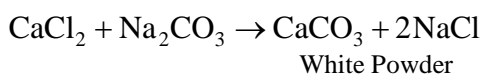
1.  $\text{Ca}(\text{OH})_2$  + sand – mortar – building material  
1:4
2. For white wash
3. Manufacture of glass - tanning of leather
4. manufacture of bleaching powder
5. Purification of sugar

### $\text{CaCO}_3$ - lime stone

naturally existing



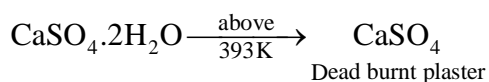
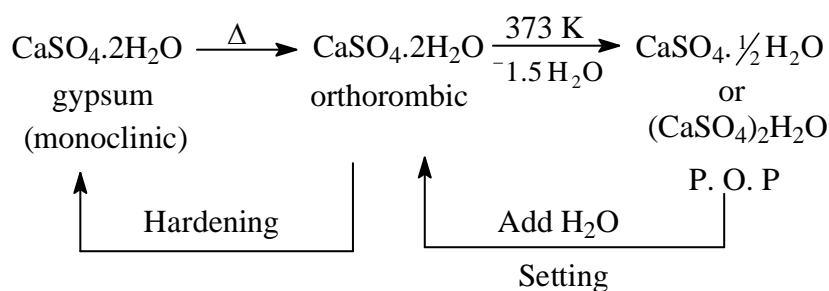
or



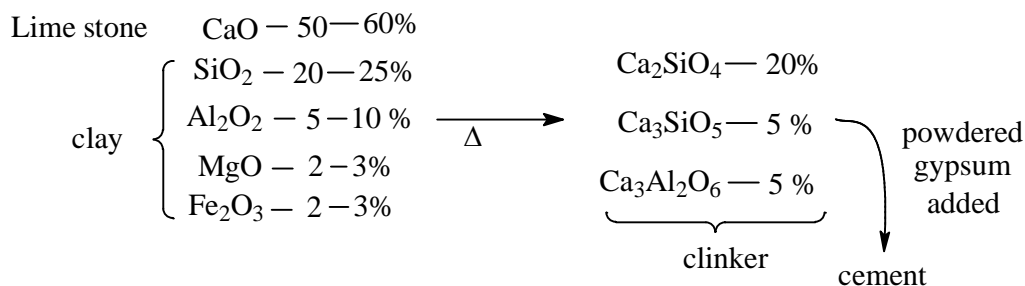
It react with dil. acids. lib –  $\text{CO}_2$

**Uses**

1. Used in building industry (marble)
2. As a flux in metallurgy
3. For manufacture of glass /paper
4. Mild abrasive in tooth paste
5. Component in chewing gum & cosmetics

**Gypsum & plaster of paris****Uses****Cement Joseph Aspdin (1824)**

Raw materials – lime stone, clay & gypsum

**Setting of cement**

When  $\text{H}_2\text{O}$  – added – hydration of molecules present & rearrangement takes place & sets hard mass

(Presence & % of gypsum control setting time)

**Biological importance of Ca & Mg**

Mg – acts as co-factor for enzymes for their ATP transfer

Mg – present in chlorophyll – for absorption of light

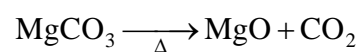
Ca – present in bones & teeth – for neuro -function

Ca – present in celles



Ca – control - two hormones – calcitonin parathyroid

**MgO - Magnesia:**



**Use:**

Used as refractory material

As a flux

Sorel cement  $\text{MgO} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

$\text{Mg}(\text{OH})_2$  – suspension used as milk of magnesia (Antacid)