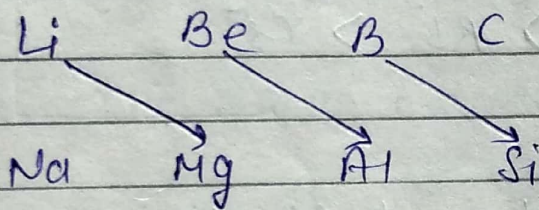


SBG STUDY

s-Block

The s-Block elements of the Periodic table are those in which the last e^- enters the s-orbital, as the s-orbital can accommodate only two e^- , hence s-Block include only two groups 1 or IA and 2 or IIA.

* Diagonal Relationship!



* Alkali Metal 1 or IA!

• Electronic Conf!

(General) [noble gas] ns^1
1 or IA

Li [He] $2s^1$

Na [Ne] $3s^1$

K [Ar] $4s^1$

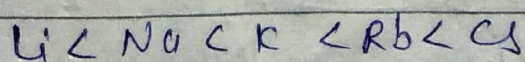
Rb [Kr] $5s^1$

Cs [Xe] $6s^1$

Fr [Rn] $7s^1$

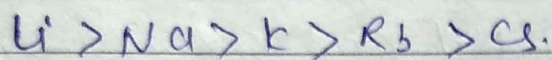
(ii) Atomic or Ionic Radii!

Down the group principle Quantum no. (n) increases, no. of shells \uparrow , atomic radius \uparrow

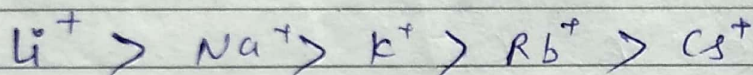


Down the group \Rightarrow $r = \text{no. of shell} \uparrow$ $\propto \frac{1}{z_{\text{effective}}} \propto \frac{1}{\text{Ionisation Energy}} \propto \frac{1}{\text{charge density}} \propto \frac{1}{\text{Hydration Enthalpy}} \propto \frac{1}{\text{M.P. B.P}}$

(iii) Ionization Energy or Enthalpy!
Down the group no. of shell \uparrow , z -effective \downarrow ,
Ionization Energy or enthalpy \downarrow



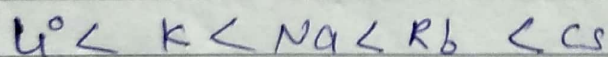
(iv) Hydration Enthalpy!
Down the group size of cation increases, charge density \downarrow , Hydration Enthalpy \downarrow .



* Physical Properties:

(1) Silvery white soft and light metals.

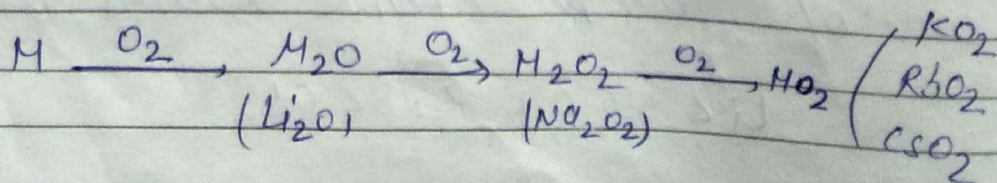
(2) $d = \frac{m}{v}$ down the group atomic wt. \uparrow more than atomic volume so density \uparrow Li to Cs. except K Potassium is lighter than Sodium

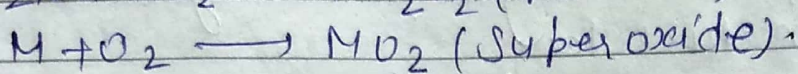
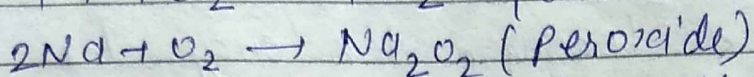
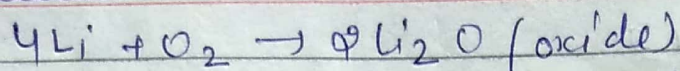


(3) Down the group melting and boiling point \downarrow from Li to Cs (due to presence of only single valence electron so weak metallic bond exist).

* Chemical Properties:

* i) Reactivity towards air!





(M = K, Rb, Cs)

$\text{O}^{-2} \Rightarrow$ mono oxide (diamagnetic)

$\text{O}_2^{-2} \Rightarrow$ Peroxide (diamagnetic)

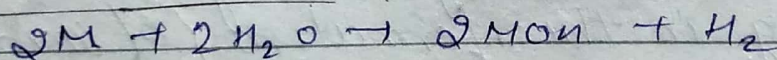
$\text{O}_2^{-} \Rightarrow$ Superoxide (Paramagnetic)

Note: $\text{Li} \Rightarrow$ Only form ~~peroxide~~ ^{oxide} monoxide (Some time Li_2O_2)

ii) ~~Sodium~~ Na \Rightarrow form peroxide (Some time Na_2O)

Sodium metal in excess of air form Na_2O and Na_2O_2

xii) Reaction with water:



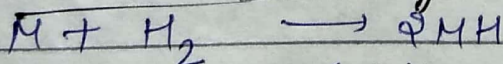
xii) Least reactive towards H_2O

(i) Na reactive vigorously (Excessive)

(ii) K, Rb, Cs

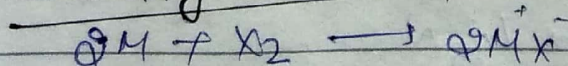
(iii)

(iii) Reaction with dihydrogen:



down the group stability of hydrides \downarrow .

x Reactivity toward Halogen:



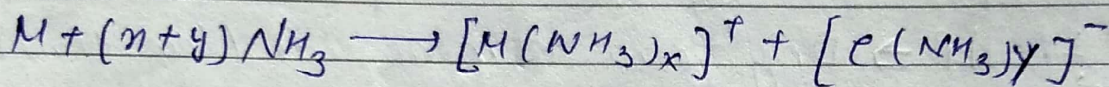
Salt
Full
face.

d-Block
Salt A = ex-2 full
J-Hair

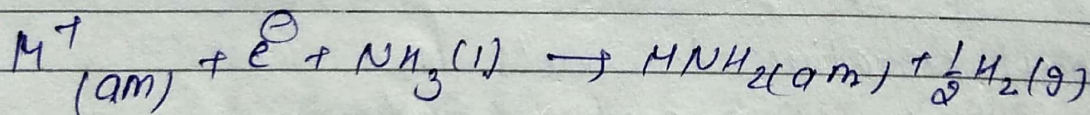
Reducing nature,
down the gp \odot losing tendency for
reducing nature for

* Solutions in liquid ammonia:

The alkali metals dissolve in liquid ammonia, giving deep blue solutions which are conducting in nature.



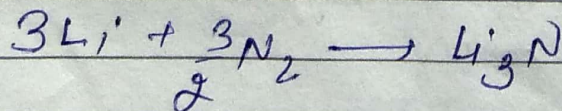
The blue colour of the solution is due to the ammoniated electron which absorbs energy in the visible region of light and thus imparts blue colour to the solution. The solutions are paramagnetic and on standing slowly liberate hydrogen resulting in the formation of amide.



(where 'am' denotes solution in ammonia) In concn. solution, the blue colour changes to bronze colour and becomes diamagnetic.

* Reaction with Nitrogen:

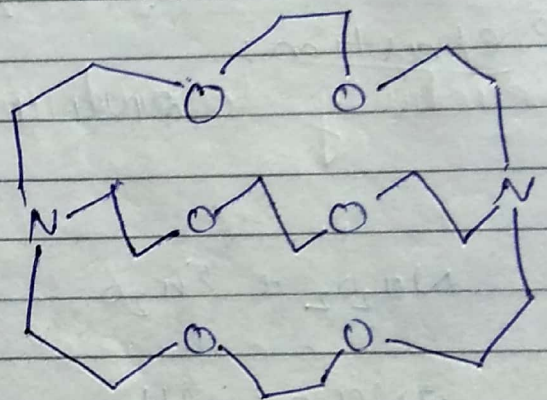
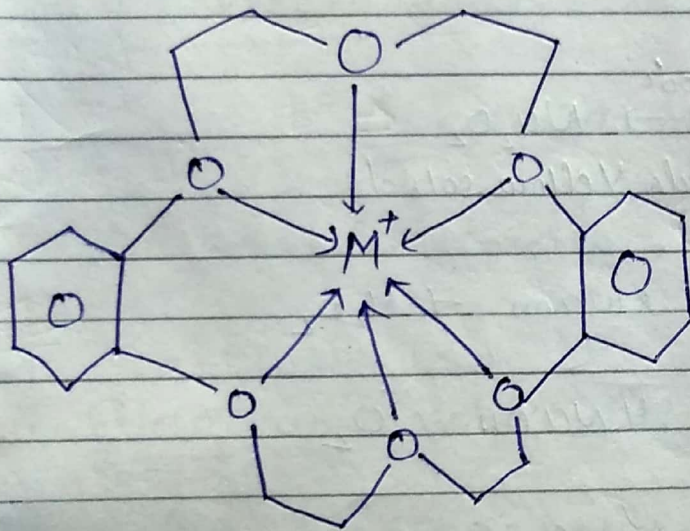
only lithium reacts with N_2 to form ionic lithium nitride Li_3N



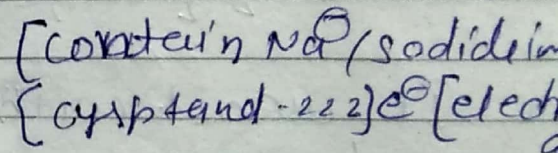
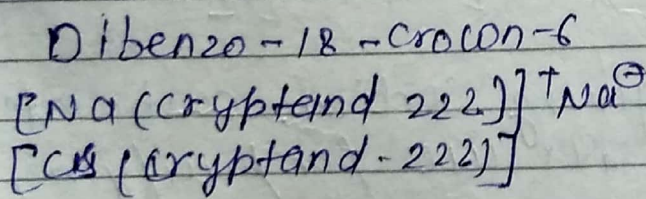
* Complex formation tendency

or

~~But~~ Crown ether and cryptands: alkaline metal cations are not good complex formation cations. But their stable complexes are formed with crown ether

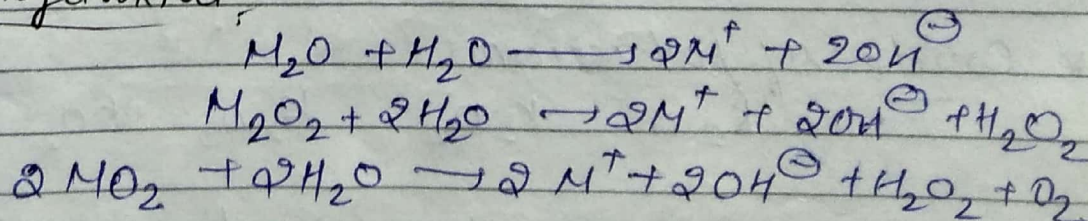


Cryptand-222



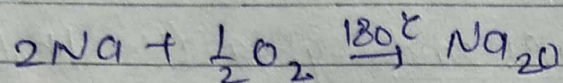
* General characteristics of the compound of the Alkali metals: All the

(i) oxide and hydroxide:

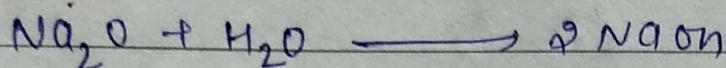


* sodium oxide (Na_2O):

Preparation:

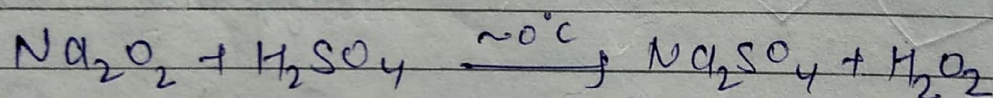
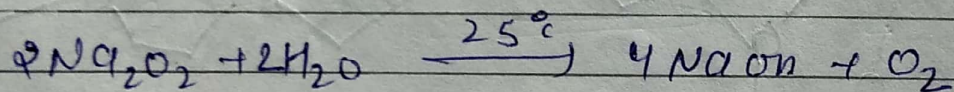
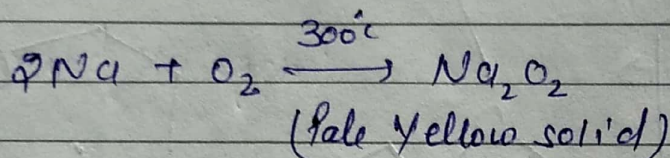


Properties:



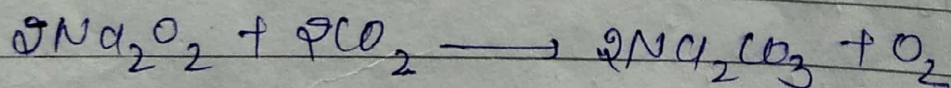
* sodium peroxide (Na_2O_2):

Preparation:

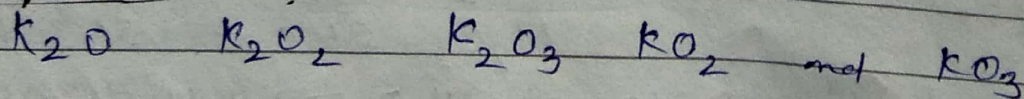


(ii) It reacts with CO_2 , giving sodium carbonate and oxygen and hence its use for purifying air in a confined space.

e.g. Submarine, ill-ventilate room



* Oxide of potassium:



Colour; white white Red Bright Yellow orange solid.

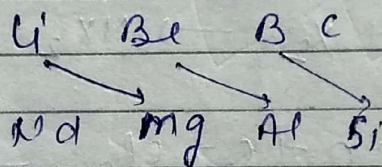
* Some important compounds of sodium:

- (i) Sodium Carbonate (washing soda) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- (ii) NaCl (sodium chloride)
- (iii) (Baking soda) (sodium hydrogen carbonate) NaHCO_3
- (iv) K_2CO_3

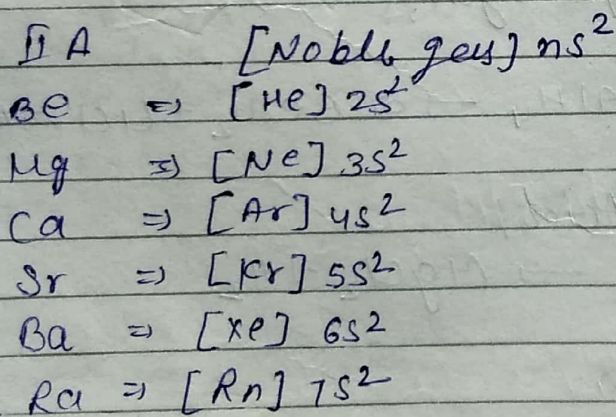
(Recall in sheet) solvay process!

Alkaline Earth metal

(1) Diagonal Relationship.



ii. Electronic Configuration:



* Atomic and Ionic Radii:

Size of IIA group element relatively smaller than IA group

Down the group, no. of shell \uparrow , size increases.

H.W. 1. s-Block
J-M, JA, SR

Salt: J. A

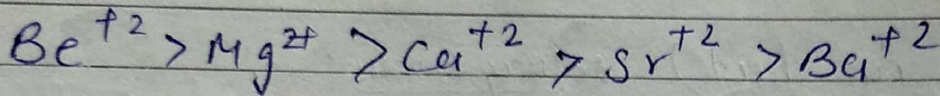
2. RCU.

* Ionization Enthalpies:

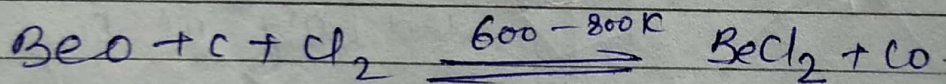
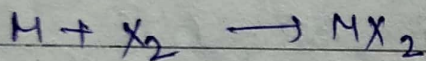
Down the group size \uparrow Ionization E \downarrow (But \uparrow IE₁ of alkali is more than alkaline metal)

* Hydration Enthalpies:

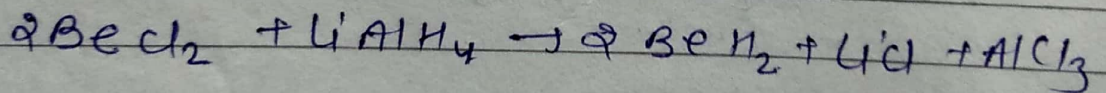
Down the group size of cation \uparrow , hydration E \downarrow



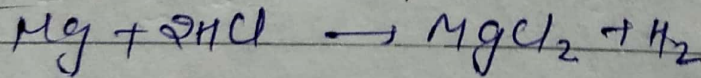
* Reactivity toward Halogen:



* Reactivity toward hydrogen:

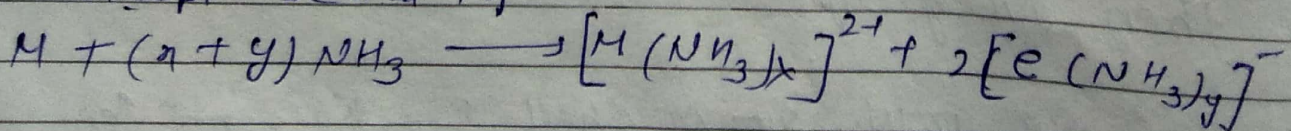


* Reactivity toward Acid:



* Solution in liquid ammonia

Like alkali metals, the alkaline earth metal dissolve in liquid ammonia to give deep blue black solution forming ammoniated ion except - Be and Mg

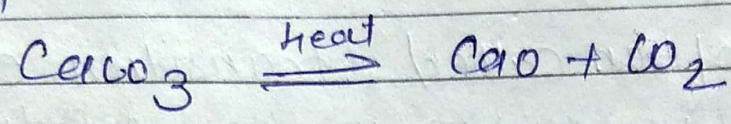


Eg. 1

* Some Important Compounds Calcium :

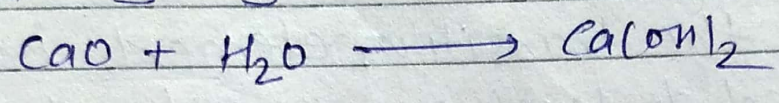
(1) Quick lime, Calcium oxide, CaO :

पिना बुझा चुना

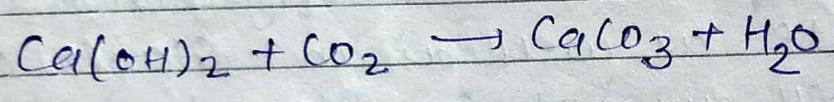


(2) ~~Calcium~~ Calcium hydroxide (Slaked lime) Ca(OH)₂ :

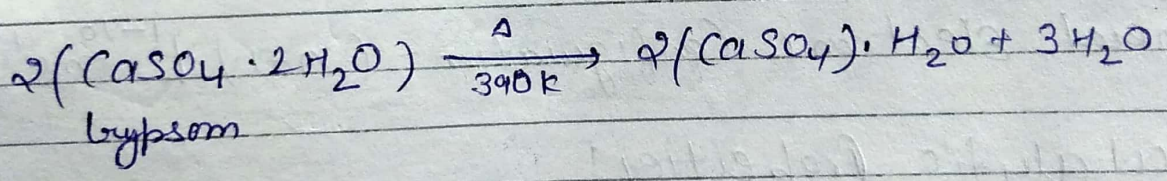
बुझा चुना



(3) Calcium carbonate, CaCO₃ :



(4) Plaster of Paris, (CaSO₄ · 1/2 H₂O) :



जेलमिन

Cement :

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