

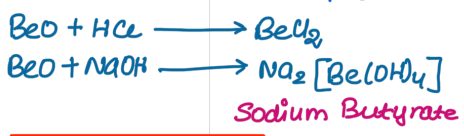


S-BLOCK

S-Block; last e- in the s-subshell.

$G_1 = Li, Na, K, Rb, Cs, Fr$	Radio-active
$G_2 = Be, Mg, Ca, Sr, Ba, Ra$	

Not alkali earth metal because = BeO and Be(OH)₂ are amphoteric in nature



PHYSICAL PROPERTY

*** Atomic Size :-**
 $G_1 = Li < Na < K < Rb < Cs < Fr$
 $G_2 = Be < Mg < Ca < Sr < Ba$ $G_1 > G_2$

*** MP and BP :-**
 MP/BP ∝ strength of metallic bonding
 depends on the no. of unpaired e-.

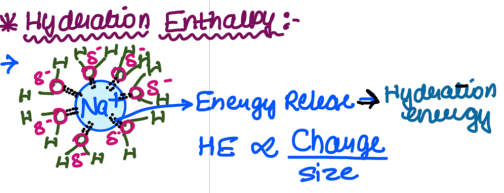
$G_1 = MP/BP \rightarrow Li > Na > K > Rb > Cs$
 $G_2 = MP \rightarrow Be > Ca > Sr > Ba > Mg$ *
 $BP \rightarrow Be > Ba > Ca > Sr > Mg$

*** Ionisation energy :-**
 $G_1 \rightarrow Li > Na > K > Rb > Cs$
 $G_2 \rightarrow Be > Mg > Ca > Sr > Ba$

NOTE 3

IE ₁	IE ₂
Na [Ne] 3s ¹ < Mg [Ne] 3s ² $G_1 < G_2$	Na ⁺ [Ne] > Mg ⁺ [Ne] 3s ² $G_1 > G_2$

*** Density :-** $d = \text{mass}/\text{volume}$
 $G_1 \rightarrow Li < K < Na < Rb < Cs$
 $G_2 \rightarrow Ca < Mg < Be < Sr < Ba$



$G_1 - Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$
 $G_2 - Be^{+2} > Mg^{+2} > Ca^{+2} > Sr^{+2} > Ba^{+2}$
 HE :- $Li^+ < Be^{+2}$ $G_1 < G_2$

NOTE :-
Case I :- Gaseous Phase :-
 $Li^+(g) > Na^+(g) > K^+(g) > Rb^+(g) > Cs^+(g)$
 Size: $Li^+(g) < Na^+(g) < K^+(g) < Rb^+(g) < Cs^+(g)$
 Mobility: Electrical Conductivity.
 $Li^+(g) > Na^+(g) > K^+(g) > Rb^+(g) > Cs^+(g)$
Case II :- Aqueous phase :- Hydration energy.
 $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq)$
 Size: $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq)$
 Mobility: $Li^+(aq) < Na^+(aq) < K^+(aq) < Rb^+(aq) < Cs^+(aq)$

6) Flame Test

Li :	Crimson Red
Na :	Golden Yellow
K :	Violet
Rb :	Dark Violet
Cs :	Blue

Be and Mg does not give Flame color

Ca :	Brick Red
Sr :	Crimson Red
Ba :	Apple Green

↳ because c- is packed.

*** PHOTO-ELECTRIC EFFECTS :-**
 $G_1 = Li < Na < K < Rb < Cs$
 $G_2 =$ DO NOT show photoelectric effects.
 metal surface.

*** Standard Oxidation Potential :-**
 All alkali metals have positive value of oxidation potential hydration energy.
 Order: $Li > Cs > Rb > K > Na$ (G_1)
 ↳ Li has highest oxidation potential due to its high hydration energy.
 $G_2 \rightarrow Be < Mg < Ca < Sr < Ba$ $G_1 > G_2$

CHEMICAL PROPERTIES :-

*** Reactivity :-**
 $G_1 = Li < Na < K < Rb < Cs$
 $G_2 = Be < Mg < Ca < Sr < Ba$

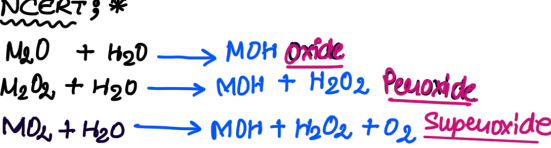
Oxide	Peroxide	Superoxide
O^{2-}	O_2^{2-}	O_2^-
Diamagnetic	Diamagnetic	Para-magnetic
Colourless	Colourless	Coloured
$G_1 - M_2O$	M_2O_2	MO_2
$G_2 - MO$	MO_2	X DO NOT form superoxide

Stability :- oxide > peroxide > superoxide

CASE 1 :- Less amount of O₂
 $Li + O_2 \rightarrow Li_2O$ oxide
 $Na + O_2 \rightarrow Na_2O_2$ Peroxide
 $K, Rb, Cs + O_2 \rightarrow KO_2, RbO_2, CsO_2$ Superoxide

CASE 2 :- Excess amount of O₂
 $Li + O_2 \rightarrow Li_2O + Li_2O_2$
 $Na + O_2 \rightarrow Na_2O + Na_2O_2 + NaO_2$
 oxide Peroxide Superoxide

NOTE :- stability of peroxide & superoxide increase down the group. large cation need large anion i.e. lattice energy.



*** Reactivity of H₂ :-**
 $G_1 \rightarrow M + H_2 \rightarrow MH$ H^- small anion require small cation.
 $G_2 \rightarrow M + H_2 \rightarrow MH_2$
 stability: $LiH > NaH > KH > RbH > CsH$

G_1 elements directly combined with H₂
 G_2 elements directly combined with H₂ except Be.



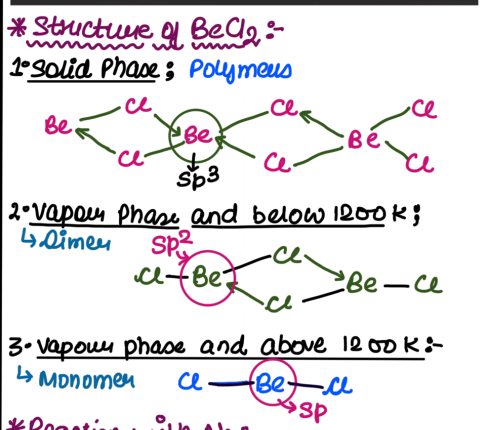
*** Reactivity with H₂O :-**
 $G_1 = M + H_2O \rightarrow MOH + H_2 \uparrow$
 Basic: $LiOH < NaOH < KOH < RbOH < CsOH$
 $Li-OH$ strong
 OH^- nikarna Tough
 $Na-OH$ weak
 OH^- nikal na easy

*** Reactivity with Halogens :-**
 $G_1 = M + X_2 \rightarrow MX$ (Halide)
 $LiCl \rightarrow$ Max covalent, min BP & MP
 $NaCl \rightarrow LiCl \cdot 2H_2O$ (water of crystal)
 KCl MP/BP :-
 $RbCl$ Fluoride > Chloride > Bromide > Iodine
 $CsCl \rightarrow$ min covalent, Max BP & MP

Fajan's Rule :- For max covalent chr. cation small (Li), anion large
 MP/BP ∝ Ionic chr ∝ 1/Covalent chr

*** Solubility depends on two factors :-**
 1. Lattice energy ∝ solubility ∝ 1/LE
 2. Hydration energy ∝ solubility ∝ HE
 Compound → soluble; i) low LE ii) high HE

- NOTE :-**
- LiF has low solubility because of its higher Lattice Enthalpy
 - CsI has low solubility because of its very low hydration enthalpy.
 - BeCl₂ and MgCl₂ are covalent.



*** Reaction with N₂ :-**
 $G_1 =$ only Li React with N₂ :-
 $Li + N_2 \rightarrow Li_3N$ (Lithium Nitride)
 $G_2 =$ All elements reacts with N₂ :-
 $3M + N_2 \rightarrow M_3N_2$

7) Solubility in liquid NH₃ G_1
 $M + (x+y) NH_3(l) \rightarrow [M(NH_3)_x]^+ + [y(NH_3)]^-$
 Ammoniated cation Ammoniated anion
 All the alkali metals dissolves in NH₃ and produces blue coloured solution
 Blue coloured solution is reducing and paramagnetic in nature due to presence of ammoniated electrons.
 Solution is good conductor due to presence of both ammoniated cation and ammoniated electron
 Dark blue color of solution becomes fade if it is allowed to stand for a long time.