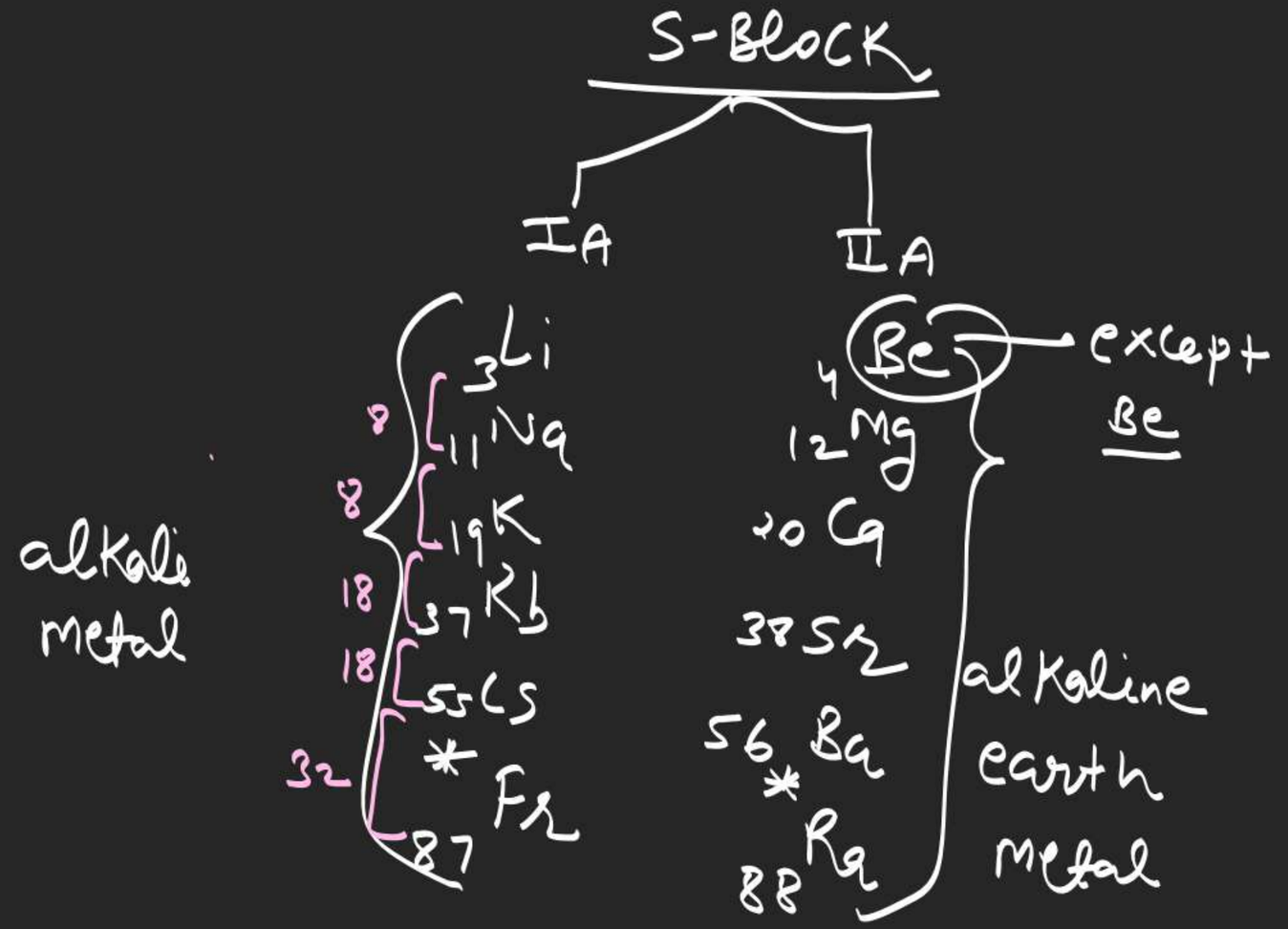
V.

Verdigris :→

$Cu(CH_3COO)_2 \cdot Cu(OH)_2$

Basic Copper acetate

Nishant Jindal



alkali metals

① Atomic size ↑ down the group because shell ↑

② I.E ↓ bcoz shell ↑

{ Li > Na > K > Rb > Cs < Fr* }

{ Li > Na > K > Rb > Fr > Cs }

{ Be > Mg > Ca > Sr > Ba < Ra* }

{ Be > Mg > Ca > Sr > Ra > Ba }

due to poor S.E of 4f subshell

$D = \frac{M}{V}$ (M ↑, V ↑)

D ↑ down the group ↑

$Li < Na > K < Rb < Cs$

Imp: $D_{Na} > D_K$

$Li < K < Na < Rb < Cs$

Na

$1s^2 2s^2 2p^6 3s^1$

Capicity of e^- : 8

Filling of e^- : 8

K

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^0 4s^1$

18

8

Nishant Jindal

(Metallic bond strength ↑)

M.B.S ∝ no of u.p.e

M.B.S ∝ $\frac{1}{\text{size}}$

order of M.B.S

Li > Na > K > Rb > Cs > Fr

M.P	B.P ∝ M.B.S

M.B.S ↓ down the group, so M.P/B.P ↓

Li > Na > K > Rb > Cs > Fr → liq. at 27°C

Softness –

These metals are soft and easily cut by knife. These metals have metallic luster due to presence of free e^-

M.B.S $\propto \frac{1}{\text{Size}}$

Order of Hardness

Li > Na > K > Rb > Cs

Crystalline structure

B.C.C

having C.N = 8

P.E.E → these metals show P.E.E due to low I.E

K Rb Cs

flame test

due to low I.E
these metals show colours in flame

Li = Carmine Red [Crimson Red]
Na = golden yellow
K = lilac (Pale violet)
Rb = Reddish Violet
Cs = Blue
Ca = Brick Red
Sr = Crimson Red
Ba = Apple green

Note ⇒ Be and Mg donot show flame test due to their high I.E

Nishant Jindal

Reducing Power

Li^+ = small size
So charge density ↑

Reducing power ↑ down the group

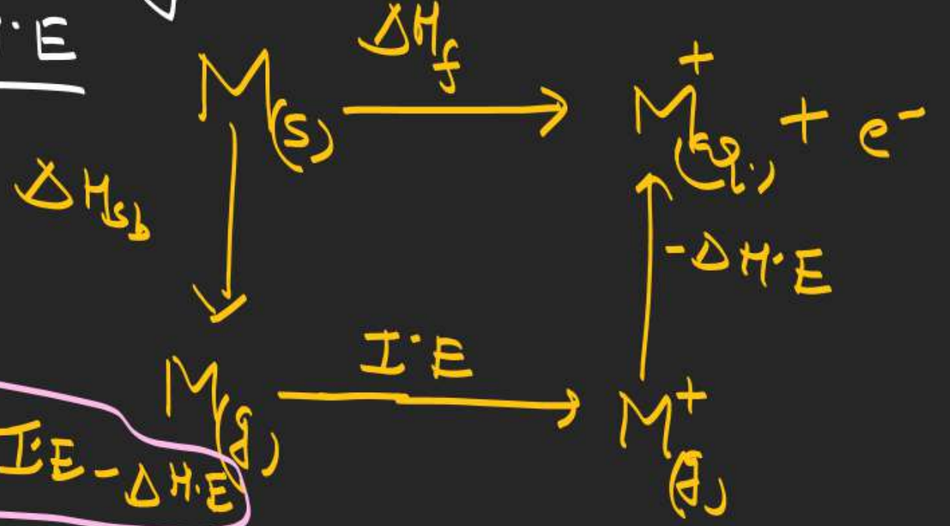
$Li > Cs > Rb > K > Na$

due to high H·E

(R·A)
$M \longrightarrow M^+ + e^-$ (oxid.)

$M^+ + e^- \longrightarrow M$ (Reduction)
(O·A)

$\Delta G = \Delta H - T\Delta S$



$\star\ \Delta H_f = \Delta H_{sb} + I.E - \Delta H.E$

Chemical prop.

these metals are more reactive due to low I.E and form Ionic compound but

$LiX \Rightarrow$ Predom Covalent

($X = Cl, Br, I$)

because they are more reactive they Kept in organic solvent (Kerosene) except Li because Li lighter. it is Kept in paraffin papers

Que Why C_2H_5OH not use.

$C_2H_5OH + Na \longrightarrow C_2H_5ONa + H_2$

Nishant Jindal

Chemical Reaction

① Reaction with O_2

$$Li + O_2 \longrightarrow \underset{\text{(oxide)}}{Li_2O} \xrightarrow[O_2]{\text{excess}} X$$

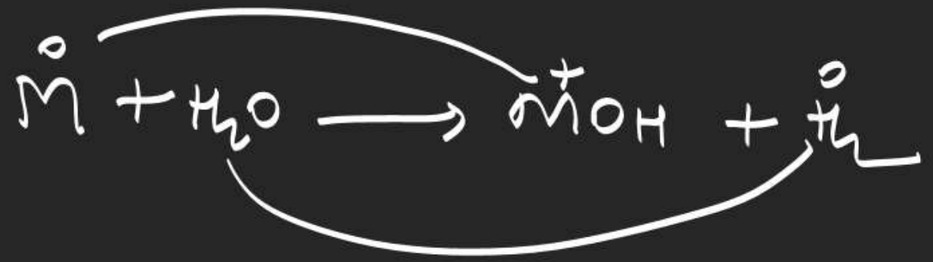
$$Na + O_2 \longrightarrow \underset{\text{(oxide)}}{Na_2O} \xrightarrow[O_2]{\text{excess}} \underset{\text{(Peroxide)}}{Na_2O_2} \xrightarrow[O_2]{\text{excess}} X$$

$$\underset{(K/Rb/Cs)}{M} + O_2 \longrightarrow \underset{\text{oxide}}{M_2O} \xrightarrow[O_2]{\text{excess}} \underset{\text{peroxide}}{M_2O_2} \xrightarrow[O_2]{\text{excess}} \underset{\text{Superoxide}}{MO_2}$$

Note ⇒ these metal cation stabilize with their comparable size of anion.

Gmp

Reaction with water



order of reactivity

Li < Na < K < Rb < Cs

Li = gently react with water

Na = vigorously react with water

K | Rb | Cs = violently react with water

this explanation lie in Kinetics not in thermody. , When K, Rb, Cs react with water then Heat of reaction is sufficient to make it melt or vaporise melton metal spreaed on surface of water so surface area increases and reaction becomes faster.

Reaction with H_2

$M + H_2 \longrightarrow \overset{+}{M}\overset{-}{H}$

- Ionic
- crystalline solid
- non conductor in solid state but in molten state they are conductor
- non volatile
- Saline hydride

Order of reactivity

Li > Na > K > Rb > Cs

due to High I.E

Reaction with N_2

$$Li + N_2 \longrightarrow \underset{\text{OH}}{Li_3N} \xrightarrow[H^+ - OH^-]{\text{Hydrolysis}} LiOH + NH_3$$

$$Li_3N \xrightarrow{\Delta} Li + N_2$$

$$M + N_2 \longrightarrow X$$

(Na | K | Rb | Cs)

Nishant Jindal

$$\phi \text{ (Polarising power)} = \frac{\text{Charge}}{\text{Size}}$$

Charge density

$O^{-2} \xrightarrow{\frac{1}{2}O_2} O_2^{-2} \xrightarrow{\frac{1}{2}O_2} O_2^{-}$

Oxide — Peroxide — Superoxide

Li^+ Be^{+2}
Na^+ Mg^{+2}
K^+ Ca^{+2}
Rb^+ Sr^{+2}
Cs^+ Ba^{+2}

Size ↑

Charge density ↓

Nishant Jindal

$_{87}Fr = [Xe]\ 4f^{14}\ 5d^{10}\ \underline{6s^1}$

$_{88}Ra = [Xe]\ 4f^{14}\ 5d^{10}\ 6s^2$

$S > p > d > f$