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Chemical prop of alkali metal (IA)

H-W
Sheet chemical bonding

ex-1

these metals are more reactive and their metallic surface becomes tarnish when they exposed in air so they kept in organic solvent like kerosene except Li because Li is lighter so it is kept in paraffin paper

Que Why C_2H_5OH not use as organic solvent for alkali metal

$$C_2H_5OH + Na \longrightarrow C_2H_5ONa + H_2$$

Li	Be
Na	Mg
K	Ca
Rb	Sr
Cs	Ba

$\phi = \frac{\text{Charge}}{\text{Size}}$

(ϕ = charge density)

O^{-2} oxide

O_2^{-2} peroxide

O_2^{-} Super oxide

down the group size ↑

ϕ = Charge density | Polarising power | degree of Covalency

Ionic potential

ϕ Reaction with O_2

$$Li + O_2 \longrightarrow Li_2O \xrightarrow[air]{excess} X$$

$$Na + O_2 \longrightarrow Na_2O \xrightarrow[air]{excess} Na_2O_2 \xrightarrow[O_2]{excess} X$$

$$\underbrace{M}_{(K|Rb|Cs)} + O_2 \longrightarrow \underset{\text{oxide}}{M_2O} \xrightarrow[air]{excess} \underset{\text{Peroxide}}{M_2O_2} \xrightarrow[O_2]{excess} \underset{\substack{\text{Super}_2\\ \text{oxide}}}{MO_2}$$

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Reaction with N_2

$$Li + N_2 \xrightarrow{\Delta} Li_3N \xrightarrow{\text{Hydrolysis}} LiOH + NH_3$$

Li_3N $\xrightarrow{\text{high temp}}$ $Li + N_2$

$$M \text{ (Na|K|Rb|(s))} + N_2 \longrightarrow X$$

$$Li_3N + 3H-OH \rightarrow LiOH + NH_3$$

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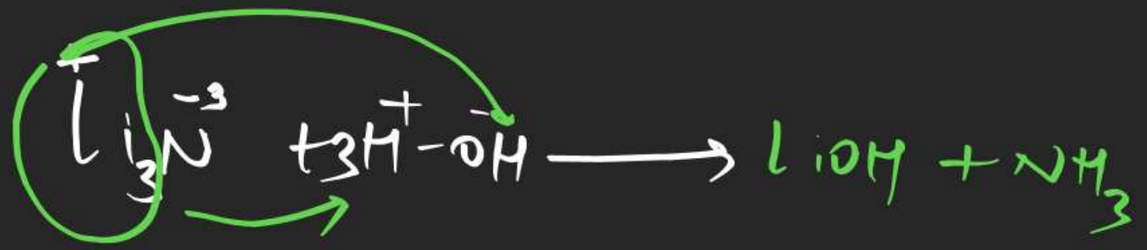

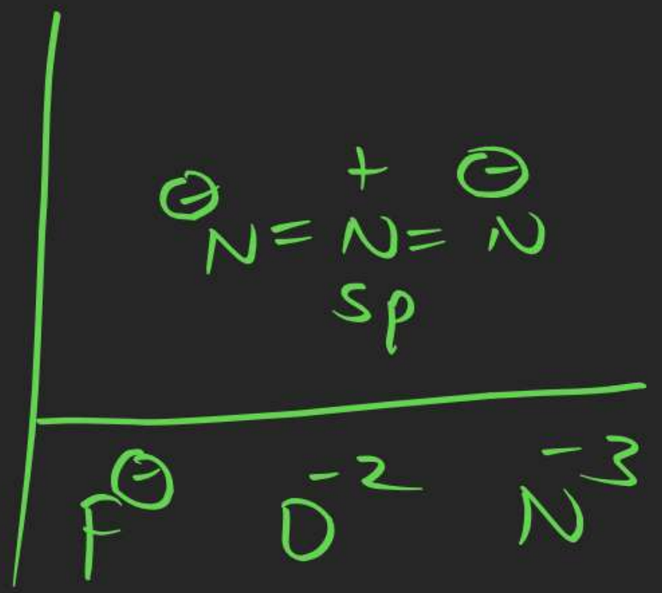

Reaction with H_2

$$M + H_2 \longrightarrow MH$$

Metal Hydride

$M + H_2 \longrightarrow \underline{MH}$

$LaH_{0.55}$

NaH

1 : 1

Metal Hydrides are ionic Crystalline solid, stiocheiometric non volatile and non Conductor in solid State but Conductor in molten state

order of reactivity

(due to high I.E) i) Na > K > Rb > Cs

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Lim ⇒ it use in meteorological balloons and for military purpose.

Reaction with Halogen

$M + X_2 \longrightarrow MX$

Metal halide

Ionic

except $LiX \longrightarrow$ Predominant covalent

($X = Cl, Br, I$)

order of reactivity for F_2

$Li > Na > K > Rb > Cs$

Ordering reactivity of $Cl_2 | Br_2 | I_2$

$Li < Na < K < Rb < Cs$

Note → Li salts are hydrated

$LiCl \cdot 2H_2O$ due to high polarising power of Li

Gun powder = S + charcoal + nitrates

ans Which of the following nitrate use in Gun powder

① $LiNO_3$ ② $NaNO_3$ ③ KNO_3 ④ all