S block elements

Elements in which last electron enters to s Subshell are called S-block elements.

Elements of Group 1 and Group 2 are S-block elements.

Gr 1 → ns^1 Gr 2 → ns^2

n → Period number or Principal Quantum number

All are stable except Fr and Ra. These are radioactive elements.

Elements of Group (1)

These elements are named as Alkali metals. They react with water to form strong bases. Strong bases are alkalies.

LiOH → weak base

$M + H_2O \longrightarrow MOH + H_2\uparrow$

MOH → Strong base

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MARCH 2019

WK	M	T	W	T	F	S	S
9					1	2	3
10	4	5	6	7	8	9	10
11	11	12	13	14	15	16	17
12	18	19	20	21	22	23	24
13	25	26	27	28	29	30	31

Saturday 09

DAY 040-325 WK 06

MEETINGS / APPOINTMENTS

All metals form strong bases (except Li) on treatment with H_2O.

$Na \xrightarrow{H_2O} NaOH$

$K \xrightarrow{H_2O} KOH$

$Rb \xrightarrow{H_2O} RbOH$

$Cs \xrightarrow{H_2O} CsOH$

} Strong bases.

Electronic Configuration :-

$Li \rightarrow 2s^1$

$Na \rightarrow 3s^1$

$K \rightarrow 4s^1$

$Rb \rightarrow 5s^1$

$Cs \rightarrow 6s^1$

No of electrons in valence orbital → 1

Oxidation state → +1

Sunday 10

DAY 041-324 WK 06

Colour :-

Li, Na, K, Rb → Silvery white

Cs → Pale gold colour

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11 Monday

WK 07 DAY 042-323

MEETINGS / APPOINTMENTS

Softness

Alkali metals are soft except Li

Li ⟶ Cs Softness increase

Atomic radii :-

Li ⟶ Cs

No of shells increase, Size increase

Atomic Volume increase, Atomic radii increase. (on moving down the group)

The atomic radii of alkali metals are largest in their respective periods.

Left ⟶ Right decreases

Ionic mobility in Water :-

Li < Na < K < Rb < Cs → Size increase

Ionic radius order

$Li^{+} < Na^{+} < K^{+} < Rb^{+} < Cs^{+}$

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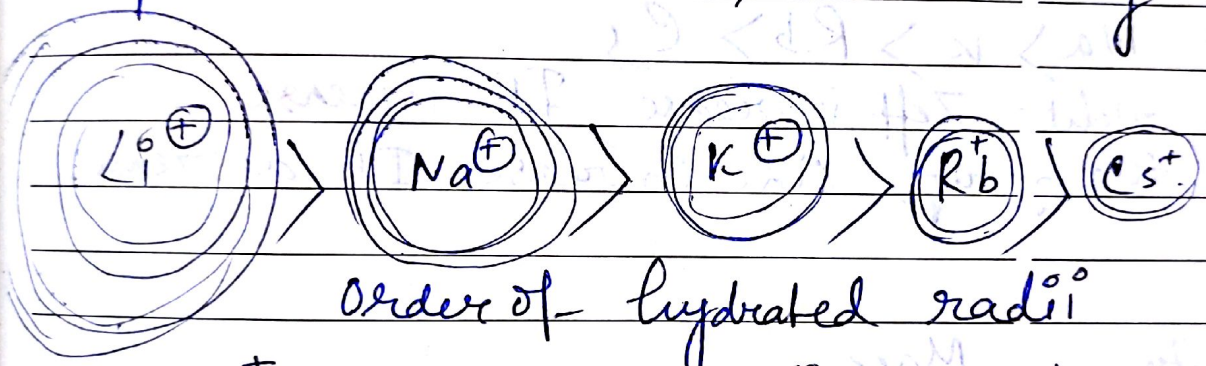
Hydrated radii

Hydration $\propto$ Charge

Hydration $\propto \frac{1}{\text{size}}$

In presence of water, $Li^{\oplus}$ heavily hydrated



Order of hydrated radii

$Li^{+}_{(aq)} > Na^{+}_{(aq)} > K^{\oplus}_{(aq)} > Rb^{+}_{(aq)} > Cs^{+}_{(aq)}$

Poor hydration

Ionic mobility in water $\propto \frac{1}{\text{hydrated radius}}$

Poor hydration $\rightarrow$ Maximum mobility

$Li^{\oplus} \xrightarrow{\text{Poor hydration}} Cs^{\oplus}$

(Max) heavily hydrated

$Li^{\oplus}_{aq} < Na^{\oplus}_{aq} < K^{+}_{aq} < Rb^{+}_{aq} < Cs^{+}_{aq}$

(less) Ionic mobility

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13 Wednesday

FEBRUARY 2019

WK 07 DAY 044-321

MEETINGS / APPOINTMENTS

FEBRUARY 2019

WK	M	T	W	T	F	S	S
5					1	2	3
6	4	5	6	7	8	9	10
7	11	12	13	14	15	16	17
8	18	19	20	21	22	23	24
9	25	26	27	28			

Ionisation Energy :-

First I.E of alkali metals are very low

I.E $\propto$ Z_{eff}

IE $\propto$ $\frac{1}{size}$

(i) Na > K > Rb > Cs

Left to right Z_{eff} increase, IE increase

Down the group, size increase, IE decrease

Density

$\frac{Mass}{Vol}$

Li
Na
K
Rb
Cs

Mass increase
Vol increase

Li < K < Na < Rb < Cs

Vol of K is abnormally high

IMPORTANT

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15 Friday

FEBRUARY 2019

WK 07 DAY 046-319

FEBRUARY 2019

WK	M	T	W	T	F	S	S
5					1	2	3
6	4	5	6	7	8	9	10
7	11	12	13	14	15	16	17
8	18	19	20	21	22	23	24
9	25	26	27	28			

MEETINGS / APPOINTMENTS

9 Electropositive character

Li ⟶ Cs increase, IE decrease

10

Crystal Structure

11

All the alkali metals have BCC

12 Structure with Coordination number 8

Coordination number → Noof nearest

1 neighbours which are in contact with a particular atom.

2

Flame Colourisation

3

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Metal	Li	Na	K	Rb	Cs
Colour of flame	Crimson Red	Golden Yellow	Violet	Red Violet	Blue
λ(nm)	670.8	589.2	766.5	780.0	455.5

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Chemical Properties of Alkali metals

9

1) Reaction with Oxygen :-

10

Li forms monoxide (Li_2O)

Sodium " peroxide (Na_2O_2)

11

other metals form Superoxides (KO_2, CsO_2 etc)

12

2) Reaction with water :-

1

They react with water and form hydroxides and liberate H_2

2

$2M + H_2O \longrightarrow 2MOH + H_2\uparrow$ [M → Alkali metal]

3

3) Reaction with dihydrogen :-

$2M + H_2 \xrightarrow{\Delta} 2M^+H^-$

M → Li, Na, K, Rb, Cs

Ionic character of alkali metal hydrides increases from Li to Cs

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18 Monday

FEBRUARY 2019

WK 08 DAY 049-316

FEBRUARY							2019
WK	M	T	W	T	F	S	S
5					1	2	3
6	4	5	6	7	8	9	10
7	11	12	13	14	15	16	17
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9	25	26	27	28			

MEETINGS / APPOINTMENTS

i) Reaction with halogen

$2M + X_2 \rightarrow 2M^+X^-$ ($X = F, Cl, Br, I$)

Melting points of (particular halide) LiX is less than that of NaX, thereafter the melting points decrease on moving down the group from Na to Cs

Melting point of LiCl is less than that of NaCl

LiCl → Covalent

NaCl → Ionic

LiCl (887K) < NaCl (1084K) > KCl (1039K) > RbCl (988K) > CsCl (926

Lattice enthalpy decreases as the size of the alkali metal atom increases.

IMPORTANT

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20 Wednesday

WK 08 DAY 051-314

MEETINGS / APPOINTMENTS

Anomalous behaviour of Li°

9

$LiOH$ is a weak base while the hydroxides
10 of other alkali metals are strong bases.
On heating at 900°C, $LiOH$ decomposes
11 to give Li_2O but the hydroxides of
other alkali metals fail to decompose
12 even on strong heating

Li reacts with nitrogen to form Li_3N

Li_2CO_3 decomposes on heating

3 ## Similarities between Li and Mg

4 # Hardness, M.P and b.p

5 # Formation of nitride

6 Uses

IMPORTANT

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