

IA	IIA
H	
Li	Be
Na	Mg
K	Ca
Rb	Sr
Cs	Ba
Fr	Ra

7. S-BLOCK ELEMENTS

2VSAQ = 4 Marks

CONCEPTS & DEFINITIONS

I. Alkali metals

1. Alkali metals: Elements of group IA Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Caesium (Cs) and Francium (Fr) are called Alkali metals (their oxides form strong alkalies when dissolved in water)

Alkalis are water soluble bases

2.1 The outer electronic configurations of group I A elements is ns^1 .

They show +1 oxidation state

2.2 Francium (Fr) is a radio active element.

2.3 Most abundant Alkali metal is Sodium and least available Alkali is Francium

2.4 Alkali metals are highly **reactive**.

2.5 Alkali metals are highly **electropositive** and good **reductants**.

2.6 Hydroxides of Alkali metals are water soluble and the solutions are **basic**.

2.7 Alkali metals usually form **ionic compounds**.

3.1 Sodium (Na) is prepared by the electrolysis of fused **NaOH** in **Castner's process**.

3.2 Sodium (Na) is prepared by the electrolysis of fused **NaCl** in **Down's process**.

4.1 Sodium hydroxide (NaOH) is called **Caustic soda**.

4.2 NaOH is prepared by the electrolytic process in **Nelson cell** (or) Castner - Kellner cell.

5.1 Anhydrous Na_2CO_3 is called **Soda ash**. This is prepared by Solvay-Ammonia Soda process.

5.2 $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ is called **Washing soda**.

5.3 NaHCO_3 is called **Baking soda**.

II. ALKALINE EARTH METALS:

6. Alkaline earth metals: Elements of group IIA [Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Br), Radium (Ra) are called Alkaline earth metals (because, their oxides are thermally very stable and are basic in nature)

6.1 The general electronic configuration of group IIA elements is ns^2 .

They show +2 oxidation state

6.2 Radium (Ra) is a radio active element

6.3 Electro positive character (hence, Reducing ability) of Alkaline earth metals is less than Alkali metals

6.4 Alkaline earth metals (except Be) form **Ionic compounds**. Be forms Covalent compounds.

6.5 Alkaline earth metals are also very **reactive**.

6.6 Alkaline earth metals are Harder than Alkali metals.

6.7 Alkaline earth metals are **Malleable, Ductile** and **good conductors** of electricity.

7.1 Magnesium is extracted by the electrolysis of fused $MgCl_2$.

7.2 Alkyl Magnesium Halides are known as **Grignard reagents**. $(RMgX)(CH_3MgCl)$

7.3 Magnesium sulphate heptahydrate $(MgSO_4 \cdot 7H_2O)$ is called **Epsom salt**.

7.4 A suspension of $Mg(OH)_2$ in water is called **Milk of magnesia**.

8.1 Mortar is a mixture of lime, sand and water.

8.2 Lime Mortar is a mixture of 1 part of slaked lime, 3 parts of sand and water.

9.1 Calcium sulphate di hydrate $CaSO_4 \cdot 2H_2O$ is called **Gypsum**

9.2 Calcium sulphate semi hydrate $CaSO_4 \cdot \frac{1}{2} H_2O$ is called **Plaster of Paris**.

☛ For **Chem Beats** of this chapter Refer Page No. **249**

CONCEPT MAP OF THE s-BLOCK ELEMENTS

s-Block Elements

Gr 1: Alkali metals

Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Caesium (Cs) and Francium (Fr)

- E.C : ns^1 .
- Oxidation state +1
- Atomic Radii $\uparrow$ down a group.
- Ionization Enthalpy $\downarrow$ down a group.
- Hydration Enthalpy $\downarrow$ down a group.

Physical Properties

Silvery white, soft, light, low mp and bp.

Chemical Properties

Reactivity towards (i) air (ii) water (iii) dihydrogen (iv) halogens (v) Reducing nature: Strong

Uses: Alloys, Aircrafts, Fertilizers,...

General characteristics

- (i) Oxides & Hydroxides
- (ii) Halides
- (iii) Salts of Oxo-acids

Important compounds of Sodium

Sodium Chloride (Rock Salt) NaCl

Sodium hydroxide (**Caustic soda**) NaOH

Baking soda NaHCO_3 ,

Sodium Carbonate (Washing Soda) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Glauber's Salt $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

Chile salt peter NaNO_3

Biological Importance

Na: transmission of nerve signals,...

K: activating many enzymes,...

Gr 2 : Alkaline Earth Metals

Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Br), Radium (Ra)

- E.C: ns^2 .
- Oxidation state +2
- Atomic Radii $\uparrow$ down a group.
- Ionization Enthalpy $\downarrow$ down a group.
- Hydration Enthalpy $\downarrow$ down a group.

Physical Properties

Silvery white, soft, little high mp and bp.

Chemical Properties

Reactivity towards (i) air (ii) water (iii) Hydrogen (iv) Acids (v) Reducing nature: Strong

Uses: Alloys, Springs, Radio therapy.

General characteristics

- (i) Oxides & Hydroxides (ii) Halides
- (iii) Salts of Oxo-Acids:

Carbonates, Sulphates, Nitrates

Important compounds of Calcium

Calcium Oxide (Quick Lime) CaO

Calcium Hydroxide (Slaked lime) $\text{Ca}(\text{OH})_2$

Calcium Carbonate (Lime Stone) CaCO_3

Calcium sulphate (**Plaster of Paris**)

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$

Biological Importance

Mg: green component of plants,...

Ca: muscle contraction,...