

# GROUP – 1 THE ALKALI METALS

Group-1 elements are Shiny, Soft, and highly reactive metals, none of them occur as a natural free element



**Li** (180.5°C)



**Na** (97.7°C)



**K** (63.4°C)



**Rb** (39.5°C)



**Cs** (25.4°C)



**Fr** (27.0°C)



All of the **Group-1 Metals** have **one** Valence Electron



The reactivity of the **GROUP-1 METALS** increases down the group as the outer electron gets further from the nucleus & becomes easier to remove.

The alkali metals react with water to form

## METAL HYDROXIDES



Alkali metals react with **oxygen** to form  
**METAL OXIDES**



Alkali metals react with **halogens** to form  
**IONIC SALTS**

## PROPERTIES OF ALKALI METALS



Silver-like lustre



Low melting point



High Ductility



High malleability



Excellent conductor of heat and electricity



# Properties of Alkali Metals



## VERY SOFT



- Alkali metals can be easily cut with a knife
- Among all alkali metals lithium is hardest.

## ELECTRONIC CONFIGURATION



**ns<sup>1</sup>**

- They have one valence shell electron.
- General valence electronic configuration

## USES

### LITHIUM

- Anti depressants
- Batteries



### SODIUM

- Street lamps
- Salt



### POTASSIUM

- Fertilizers



### CAESIUM

- Atomic Clocks



## ATOMIC SIZE



- Li Na K Rb
- Size increases down the group due to added extra orbit.

## ELECTROPOSITIVE

It is the ability to remove an electron

**Cs**



- Electropositivity increases down the group.
- Caesium** has the highest electropositive character.

## STORED IN KEROSENE



Alkali metals react with air easily to form oxide layer therefore they are stored in kerosene.



## REACTS WITH WATER

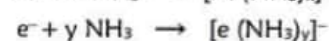
**H<sub>2</sub>O**



- They react violently with water and form hydroxides.
- Don't even dare to go near when **caesium** reacts with water.

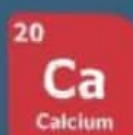
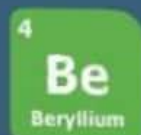
## REACTS WITH AMMONIA

On dissolving NH<sub>3</sub> forms Ammoniated cation and electron. Solution turns blue





# ALKALINE EARTH METALS



## ELECTRONIC CONFIGURATION



Valence  
Electrons  
= 2

## DO YOU KNOW ?

Kidney stones generally consist of calcium oxalate,  $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$  which dissolves in dilute strong acids but remains insoluble in bases.



## ATOMIC SIZE

Size increases down the group due to added extra orbit.

## ELECTROPOSITIVITY

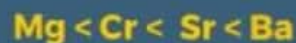
Strong electropositive elements due to large size, electropositivity increases down the group.



They are commonly called alkaline earth metals because their oxides are alkaline in nature and are found in earth's crust.

## REACTION WITH WATER

**Be** does not react even with boiling water and **Ba** react vigorously even with cold water. Thus increasing order of reactivity with water is



## REACTION WITH NITROGEN

These metals react with nitrogen to form nitrides of the types  $\text{M}_3\text{N}_2$  which are hydrolysed with water to evolve  $\text{NH}_3$ .



## USES

### ● BERYLLIUM

Corrosion resistant alloys

### ● MAGNESIUM

Present in chlorophyll, helps in photosynthesis

### ● CALCIUM

Hydrated  $\text{CaCl}_2$  used for melting ice on roads

### ● STRONTIUM

Glass for colour television cathode ray tubes

### ● BARIUM

Nuclear Medicine










# ALKALI METALS

DIFFERENCE  
? BETWEEN

# ALKALINE EARTH METALS

PROPERTIES	ALKALI METALS	ALKALINE EARTH METALS
Physical properties	Soft, Low melting point, Paramagnetic. 	Comparatively harder. High melting point, Diamagnetic
Valency	Monovalent	Bivalent
Electropositive nature	More electropositive	Less electropositive 
Hydroxides 	Strong base, highly soluble and stable towards heat.	Weak base, less soluble and decomposes on heating.
Bicarbonates	These are known in solid state.	These are not known in free state. Exist only in solution
Carbonates	Soluble in water. Do not decomposes on heating ( $\text{LiCO}_3$ is an exception)	Insoluble in water. Decomposes on heating.
Action of carbon	Do not directly combine with carbon 	Directly combine with carbon to form carbides 
Solubility of salts	Sulphates, phosphates, fluorides, chromates, oxides etc are soluble in water.	Sulphates, phosphates, fluorides, chromates, oxalates etc are insoluble in water
Reducing power	Stronger as ionization potential values are low and oxidation potential values are high	Weaker as ionization potential values are high and oxidation potential values are low.
Electronic configuration 	One electron is present in the valence shell. The configuration is $ns^1$ (monovalent)	Two electrons are present in the valence shell. The configuration is $ns^2$ (bivalent)

