

## Understanding the s Block Elements

As per the chemistry class 11 syllabus, elements have an entire chapter based on them. Group 1 and group 2 elements combined are known as s-block elements. Group 1 elements are Alkali Metals, while group 2 elements are Alkaline Earth Metals. Alkaline earth metals and alkali metals are both characterized by the presence of s-electron in the valence shell of their atoms – two and one, respectively.

### s Block Elements Name

Do you know all the elements in s Block? Here is the list of all elements you should know:

1. Hydrogen (H)
2. Lithium (Li)
3. Helium (He)
4. Sodium (Na)
5. Beryllium (Be)
6. Potassium (K)
7. Magnesium (Mg)
8. Rubidium (Rb)
9. Calcium (Ca)
10. Cesium (Cs)
11. Strontium (Sr)
12. Francium (Fr)
13. Barium (Ba)
14. Radium (Ra)

### s Block Elements: Alkali Metals

The Alkali Metals have got their names because of their reaction with water results in alkalies (strong bases – opposite of acids, and capable of neutralizing them). The six elements that are in Group 1 are Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), and Francium (Fr). The metals are silvery-white in appearance and are soft and low-melting, but highly volatile. Both ionic and atomic sizes increase as we go down the table.

### s Block Elements: Alkaline Earth Metals

Alkaline Earth Metals are shiny and silvery-white. The s-block elements are found in Group 2 of the atomic table. Alkaline Earth metals are Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Ba), and Radium (Ra). They are somewhat

reactive in standard conditions of temperature and pressure. their hydroxides and oxides are less basic as compared to Alkali metals.

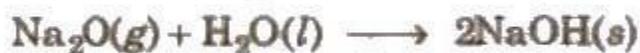
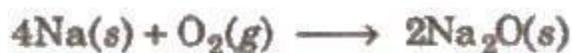
## s Block Elements: Diagonal Relationships

Diagonal Relationships is one of the important concepts of class 11 s block elements. As per the diagonal relationship, *the first element of group 1 and the second element of group 2 show similar properties.* For Example, *properties of Lithium (Li) and Beryllium (Be) can be found to be similar.*

## Some Properties of Alkali Metals

To fully understand this chapter, it is important to go through the properties of alkali metal. As per NCERT chemistry class 11, the alkali metals belonging to the this block exhibit the following properties-

- The metals have low melting and boiling point because of the prevalence of weak metallic bonds. They decrease as we go further down the table, with Francium being liquid at room temperature
- They are soft, malleable, and ductile. They can even be cut by a knife, and the oscillation of electrons induces a metallic lustre when freshly cut
- Atomic volume is high and increases from top to bottom
- Electropositivity is high in alkali metals due to low ionization enthalpy, and it increases further from top to bottom due to a further decrease in ionization enthalpy. For Example:  $\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{Cs}^+$
- Alkali magnets are diamagnetic in nature. They show noble gas configuration with only +1 oxidation state
- The electrical conductivity is high of the s block elements and increases down the table. For Example:  $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$
- When exposed to light, alkali metals showcase photoelectric effect because of low ionization enthalpy
- Alkali metals are good reducing agents in the order:  $\text{Na} < \text{K} < \text{Rb} < \text{Cs} < \text{Li}$
- They form oxides, hydroxides, and carbonates, very easily when exposed to moisture. Hence, they are kept in inert liquid like kerosene oil, while lithium floats on kerosene due to low density and is wrapped in paraffin wax



- Upon heating with oxygen, oxides, peroxides, and superoxides are formed, the stability of which increases as we go down the table. They are basic in nature with strength being:  $\text{Li}_2\text{O} < \text{Na}_2\text{O} < \text{K}_2\text{O} < \text{Cs}_2\text{O}$
- Upon reaction with compounds with acidic hydrogen-like water, the reaction is like:  $2m + 2\text{H}_2\text{O} \rightarrow 2m\text{OH} + \text{H}_2$  (where  $m = \text{The Alkali Metal}$ )
- Upon reaction with hydrogen, the following sequence occurs in s block elements:  $2m + \text{H}_2\text{O} \rightarrow 2\text{H}$  (where  $m = \text{The Alkali Metal}$ )
- Ionic halides results when Alkali metals are made to react with halogens, barring a few lithium halides, and the reaction is as follows:  $2m + \text{X}_2 \rightarrow 2m\text{X}$  (where,  $m = \text{The Alkali Metal}$ , and  $\text{X} = \text{F, Cl, Br, I}$ )

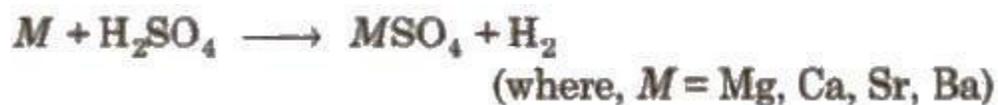
## Some Properties of Alkaline Earth Metals

It contains another important aspect – the Alkaline Earth Metals. Their properties, reactions, and exceptions are thoroughly explained in the NCERT book, let's learn about some of the properties of Alkaline Earth Metals-

- The presence of a higher number of bonding electrons results in higher melting and boiling points, although they decrease down the table. Magnesium remains an exception
- Strong electropositivity in alkaline earth metals is a result of large size and lower ionization enthalpy. Increase in the atomic radius of the respective metals and decrease in their ionization enthalpy
- A +2 oxidation state is seen, which makes the dipositive ions ( $\text{M}^{2+}$ ) forming strong lattices in the solid state because of high charge and small size, also known as high lattice enthalpy
- Compared to their alkali counterparts, alkaline earth metals belonging to the s block elements are not as reactive with water. The reaction is:  $m + 2\text{H}_2\text{O} \rightarrow m(\text{OH})_2 + \text{H}_2$  (where,  $m = \text{Mg, Ca, Sr or Ba}$ )
- When heated with oxygen; Be, Mg, and Ca form monoxides and Sr, Ba, and Ra form peroxides:



- Except Be, all these metals displace hydrogen from acids:



## Electronic Configuration of s Block Elements

Electronic configuration of s block elements is divided into 2 groups. We have a tabulated version of both the groups:

### Electronic Configuration Elements Group- 1

Element	Symbol	Electronic configuration
Lithium	Li	1s <sup>2</sup> 2s <sup>1</sup>
Sodium	Na	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>1</sup>
Potassium	K	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>1</sup>
Rubidium	Rb	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>6</sup> 5s <sup>1</sup>
Caesium	Cs	[Xe]6s <sup>1</sup>
Francium	Fr	[Rn]7s <sup>1</sup>

### Electronic Configuration Group- 2

Elements	Symbols	Electronic configuration
Beryllium	Be	[He]2s <sup>2</sup>
Magnesium	Mg	[Ne]3s <sup>2</sup>
Calcium	Ca	[Ar]4s <sup>2</sup>
Strontium	Sr	[Kr]5s <sup>2</sup>

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Barium

Ba

[Xe]6s<sup>2</sup>

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Radium

Ra

[Rn]7s<sup>2</sup>