Introduction

- Li, Na, K, Rb, Cs and Fr are collectively known as alkali metals as their oxides dissolve in water to form strong bases.
- They are placed in the first group of periodic table along with hydrogen.
- Francium is a radioactive metal.

General properties:

Occurrence: These elements do not occur in the elementary state due to their high reactivity.

- Na and K are the 6^{th} and 7^{th} most abundant elements in the earth's crust.
- The abundance decreases with the increase of atomic weight.

Electronic configuration: These elements belong to s - block and their valence shell configuration is ns^1.

- Li has 2 electrons and all others have 8 electrons in their penultimate shells. No element contains 18 electrons in their (n-1) shell.

Density: These elements have low densities when compared with the other metals.

- Density increases from Li to Fr due to increase of atomic weight.
- Potassium is less denser than sodium due to
  1. Sudden large increase in the atomic size.
  2. The presence of vacant d - orbitals
  3. Large inter-atomic distances in the crystal lattice.

Electronegativity: These are the least electronegative elements and it further decreases down the group.

Electropositive nature: (Metallic nature): These are most electropositive and it further increases down the group.

Hardness: These are soft metals. Softness further increases down the group due to decrease in the strength of metallic bond.

Valency & oxidation states: These are monovalent elements and readily form M^+ ions.

- They always exhibit only + 1 oxidation state.
- They readily form ionic compounds due to their large atomic size and low ionization potentials.
- Their metal ions are colourless and diamagnetic. Some of their compounds like $K_2Cr_2O_4$, $KMnO_4$ are colored which is due to their oxyanions.

Ionization potential: These elements have low ionization potentials due to their large atomic size. The ionization potential values decrease down the group.

Flame coloration: Alkali metals and their salts give flame coloration when heated with conc. HCl in Bunsen flame.

- Li - crimson red: Na - golden yellow; K - Lilac; Rb - red - violet; Cs - Blue – violet.

- The energy of the emitted radiation increases during the flame test from Li to Cs.

Melting and boiling points: Melting point and boiling points are low and they decrease down the group due to decrease in the strength of metallic bond.

Conductance: They are good conductors of heat and electricity due to the mobility of valence electron.

- In aqueous solution, electric conductance of their ions increases due to increase in the mobility of ions because of decrease in the size of hydrated ions from $Li^{+}_{(aq)}$ to $Cs^{+}_{(aq)}$.

Co-ordination number: In their metallic crystals Li has a coordination number of 4 or 6. Na, K, and Rb have 6 and Cs has 6 or 8.

Standard Oxidation Potentials (SOP):

- They easily undergo oxidation and have higher SOP values. SOP values increase from Na to Cs due to increase in electropositive nature. Exceptionally, Li has highest SOP value due it's greater hydration energy.