Group 1

The elements in Group 1 of the periodic table are known as the alkali metals and have characteristic physical and chemical properties.

The elements in group 1 are:

1
Li
Na
K
Rb
Cs
Fr

Physical Properties:

Elements in Group I share the following physical properties:

1. They are soft metals
2. Have relatively low melting points and boiling points. The melting point decreases going down the group, as the size of their atoms increases, weakening the attraction between atoms.
3. These elements have a low density and float on water.
4. When cut have a shiny surface, that reacts with oxygen in air and tarnishes over time.

Chemical Properties:

As we go down the group, the size of the atom increases and it becomes easier to lose an electron from the outer shell. This results in an increase in reactivity down the group. This is shown by the reaction of water with alkali metals. Lithium reacts quickly, sodium reacts violently. Potassium reacts very violently.

Lithium reacts quickly, floats on water. $2Li(s) + 2H_2O(l = 2\ LioH + H_2\ (g)$

Sodium reacts violently, may be explosive. $2Nas + 2H_2O(l) = 2NaOH + H_2(g)$

Potassium reacts very violently, explosive. $2K(s) + 2H_2O = 2KOH + H_2(g)$

They are stored in oil to prevent reaction wit hair and water.

Alkali metals are strong reducing agents. A reducing agent is a substance that can lose an electron to another substance. The substance that loses the electron is said to be oxidised, whereas the substance that gains an electron is said to be reduced. eg,

$Li(s) = Li+ + e-$

Lithium loses its electron and gets a +ve charge.

Since alkali metals lose their most electron easily, they act as strong reducing agents.

Group I elements react with oxygen to form a metal oxide:

$$4Li + O_2 \longrightarrow 2Li_2O$$

$$4Na + O_2 \longrightarrow 2Na_2O$$

$$4K + O_2 \longrightarrow 2K_2O$$

Group I elements react with Chlorine to form a Metal Chloride:

$$2Li + Cl_2 \longrightarrow 2LiCl$$

$$2Na + Cl_2 \longrightarrow 2NaCl$$

$$2K + Cl_2 \longrightarrow 2KCl$$

Alkali metals form ionic compounds such as carbonates, nitrates, sulfates, chlorides. These salts are soluble in water.