

IA Metals: Alkali Metals

INTRODUCTION:

The alkali metals are a group in the periodic table consisting of the chemical elements lithium (Li), sodium (Na), potassium (K), rubidium (Rb), caesium (Cs). You should remember that there is a separate group called the alkaline earth metals in Group Two. They are a very different family, even though they have a similar name. The seventh member of alkali metals group – francium, is radioactive and so rare that only 20 atoms of francium may exist on Earth at any given moment. The term alkali is derived from an Arabic word meaning “ashes.”

A simplified periodic table diagram. The first column (Group 1) is highlighted in green. The label "ALKALI METALS" is written in green above the first column. The table consists of a main body of 18 columns and 4 rows, with a separate section of 18 columns and 2 rows below it. The first column of the main body is shaded green.

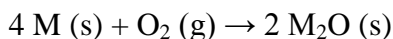
PHYSICAL PROPERTIES:

- Shiny
- Soft (They can all be cut easily with a knife)
- Highly reactive at standard temperature and pressure
- Because of their high reactivity, they must be stored under oil to prevent reaction with air
- Their density increases as we move from Li to F
- White/metal coloured
- Very good conductors of heat and electricity
- Have the ability to impart colour to the flame. This property of alkali metals is used in their identification.

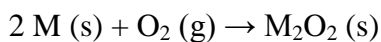
CHEMICAL PROPERTIES:

- The atom of any given alkali metal has only one valence electron.
- The chemical reactivity of alkali metals increase as we move from the top to the bottom of the group.
- Like any other metals, ionization potential is very low. In fact, alkali metals have the lowest ionization potential among the elements of any given period of the periodic table.
- Any alkali metal when comes in contact with air or oxygen, starts burning and oxides are formed in the process. At the end of the chemical reaction, lithium gives lithium monoxide (LiO), sodium gives sodium peroxide (Na₂O₂) and other alkali metals give superoxides.

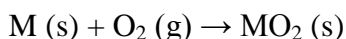
The chemical reaction of the alkali metals with oxygen that forms the oxide is:



The chemical reaction that forms the peroxide is:

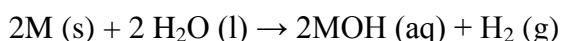


The chemical reaction that forms the superoxide is:



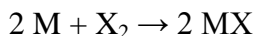
- Alkali metals react with water to form hydroxides and hydrogen gas is released in the process. The reaction is so vigorous in nature that the hydrogen gas produced during the reaction catches fire. Lithium is the only alkali metal that reacts slowly with water.

The chemical reaction of the alkali metals with water is:



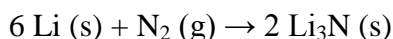
- Alkali metals react with elements of halogen group of the periodic table to form halides.

The chemical reaction of the alkali metals with the halogens is:



- Lithium, the lightest of the alkali metals, is the only alkali metal which reacts with nitrogen at standard conditions, and its nitride is the only stable alkali metal nitride.

The chemical reaction of lithium with nitrogen is:



APPLICATIONS:

- Lithium is used in heat resistive ceramics and glasses.
- Lithium batteries are packed with a lot of energy as compared to other metals. Revolutionized devices like cell phones, computers use lithium batteries.
- Lithium salts are used as mood stabilizing drug.
- Sodium salts of fatty acids are used in soap.
- Sodium compounds are used in paper, textile, petroleum and chemical industries.
- Potassium chloride is essential for the growth of plants. It is used in fertilizers.
- Potassium chlorate and potassium nitrate are used in explosives and fireworks.
- Potassium nitrate is used as a food preservative.