

CHEMISTRY

CLASS NOTES FOR CBSE

Chapter 07. Metals and Non-Metals

01. Metals and Non-Metals

Elements are divided mainly into two groups on the basis of physical and chemical properties-Metal and Non-metal.

Physical Properties of Metals :

Sound, Conduction, Malleability, Ductility, High M.P. and B.P., Density.

Chemical Properties of Metals :

Reaction with Oxygen :

Metal + Oxygen \rightarrow Metal Oxide

Examples : $4K + O_2 \rightarrow 2K_2O$

$4Na + O_2 \rightarrow 2Na_2O$

Lithium, potassium, sodium, etc. are known as alkali metals. Alkali metals react vigorously with oxygen.

Reaction of magnesium metal with oxygen:

Magnesium metal gives magnesium oxide when reacts with oxygen. Magnesium burnt with dazzling light in air and produces lot of heat.

$2Mg + O_2 \rightarrow 2MgO$

Reaction of aluminium metal with oxygen:

Aluminium metal does not react with oxygen at room temperature but it gives aluminium oxide when burnt in air.

$4Al + O_2 \rightarrow 2Al_2O_3$

Reaction of Iron metal with oxygen:

Iron does not react with oxygen at room temperature. But when iron is heated strongly in air, it gives iron oxide.

$3Fe + 2O_2 \rightarrow Fe_3O_4$

Iron fillings give sparkle in flame when burnt.

(i) Reaction of metals with water :

Metal + Water \rightarrow Metal hydroxide + Hydrogen

Most of the metals do not react with water. However, alkali metals react vigorously with water.

Reaction of sodium metal with water : Sodium metal forms sodium hydroxide and liberates hydrogen gas along with lot of heat when reacts with water.

$Na + H_2O \rightarrow NaOH + H_2$

Reaction of calcium metal with water : Calcium forms calcium hydroxide along with hydrogen gas and heat when reacts with water.

$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

Reaction of magnesium metal with water : Magnesium metal reacts with water slowly and forms magnesium hydroxide and hydrogen gas.

$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$

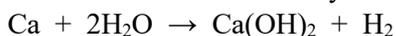


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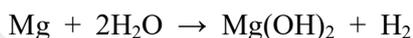
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Reaction of calcium metal with water :

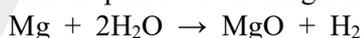
Calcium forms calcium hydroxide along with hydrogen gas and heat when reacts with water.

**Reaction of magnesium metal with water:**

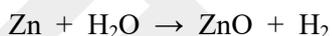
Magnesium metal reacts with water slowly and forms magnesium hydroxide and hydrogen gas.



When steam is passed over magnesium metal, magnesium oxide and hydrogen gas are formed.

**Reaction of zinc metal with water:**

Zinc metal produces zinc oxide and hydrogen gas when steam is passed over it. Zinc does not react with cold water.

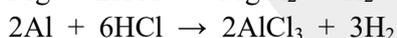
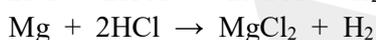
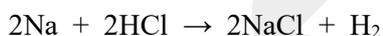
**Reaction of iron with water:**

Reaction of iron with cold water is very slow and come into notice after a long time. Iron forms rust (iron oxide) when reacts with moisture present in atmosphere.

Iron oxide and hydrogen gas are formed by passing of steam over iron metal.



Other metals usually do not react with water or react very slowly.

Reaction of metals with dilute acid :

Copper, gold and silver are known as noble metals. These do not react with water or dilute acids.

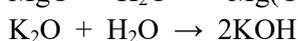
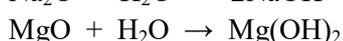
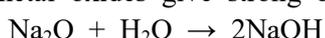
Metal Oxide : Chemical Properties

Metal oxides are basic in nature. Aqueous solution of metal oxides turns red litmus blue.

Reaction of metal oxides with water :

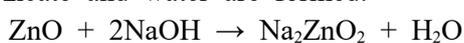
Most of the metal oxides are insoluble in water. Alkali metal oxides are soluble in water.

Alkali metal oxides give strong base when dissolved in water.

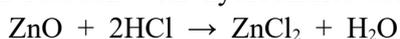
**Reaction of zinc oxide and aluminium oxide:**

Aluminium oxide and zinc oxide are insoluble in water. Aluminium oxide and zinc oxide are amphoteric in nature. An amphoteric substance shows both acidic and basic character. It reacts with base like acid and reacts with acid like a base.

When zinc oxide reacts with sodium hydroxide, it behaves like an acid. In this reaction, sodium zicate and water are formed.



Zinc oxide behaves like a base when reacts with acid. Zinc oxide gives zinc chloride and water on reaction with hydrochloric acid.



In similar way aluminium oxide behaves like a base when reacts with an acid and behaves like an acid when reacts with a base.

