

# CHEMISTRY STUDY MATERIALS FOR CLASS 10

## (NCERT Based Revision of Chapter -03)

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### METALS AND NON-METALS

Metals occupy the bulk of the periodic table, while non-metallic elements can only be found on the right-hand-side of the Periodic Table . A diagonal line, drawn from boron (B) to polonium (Po), separates the metals from the nonmetals. Most elements on this line are metalloids, sometimes called semiconductors. This is because these elements exhibit electrical properties intermediate to both, conductors and insulators. Elements to the lower left of this division - line are called metals, while elements to the upper right of the division - line are called non-metals.

**On the basis of their general physical and chemical properties, every element in the periodic table can be termed either a metal or a nonmetal.**

#### **PHYSICAL PROPERTIES OF METALS:**

- **Physical state** - Metals are solids at room temperature e.g. sodium, aluminium, potassium, magnesium. There are exceptions to this. Mercury and gallium are metals but they are in liquid state at room temperature.
- **Luster** – Metals have a shining surface called luster when freshly prepared. They have a quality of reflecting light from their surface and they can be polished e.g. metals like gold, silver, copper show this property.
- **Malleability** - Metals can be beaten into thin sheets. This property is called malleability. Due to this property, metals can be rolled into sheets e.g. aluminium, copper, zinc can be beaten into sheets.
- **Ductility** - Metals can be drawn into thin wires. This property is called ductility. For example, 100 grams of silver can be drawn into a thin wire about 200 meters long.
- **Hardness** – Metals are generally hard e.g. iron, cobalt, nickel. There are few exceptions to this. Sodium and potassium are soft and they can be cut with a knife.

- **Sound:** Metals produce ringing sound, so, metals are called sonorous. Sound of metals is also known as metallic sound. This is the cause that metal wires are used in making musical instruments.
- **Conduction** – Generally, metals are good conductors of heat and electricity because they have free electrons. Silver and copper are the two best conductors. Relatively, lead and bismuth are poor conductors of heat and electricity.
- **Density** - Metals generally have high density and they are heavy. Iridium and osmium have the highest densities while lithium has the lowest density.
- **Melting and boiling point** – Metals usually have high melting point and boiling point. For example, iron, cobalt and nickel have high melting and boiling point. Tungsten has the highest melting point. There are some exceptions to this. For example, most of the alkali metals have low melting and boiling point.
- **Strength:** Most of the metals are strong and have high tensile strength. Because of this big structures are made using metals, such as copper and iron.
- **Color:** Most of the metals are grey in color. But gold and copper are exceptions.

## INTEXT QUESTIONS PAGE NO. 40

**Question 1: Give an example of a metal which**

**(i) is a liquid at room temperature. (ii) can be easily cut with a knife.**

**(iii) is the best conductor of heat. (iv) is a poor conductor of heat.**

**Answer :** (i) Metal that exists in liquid state at room temperature → Mercury

(ii) Metal that can be easily cut with a knife → Sodium

(iii) Metal that is the best conductor of heat → Silver

(iv) Metals that are poor conductors of heat → Mercury and lead

**Question 2: Explain the meanings of malleable and ductile.**

**Answer: Malleable:** Substances that can be beaten into thin sheets are called malleable. For example, most of the metals are malleable.

**Ductile:** Substances that can be drawn into thin wires are called ductile. For example, most of the metals are ductile.

# CHEMICAL PROPERTIES OF METALS

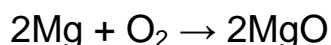
## REACTION WITH OXYGEN:

Most of the metals form respective metal oxides when react with oxygen.

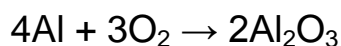


### Examples:

- 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.



- 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.

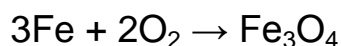


- Reaction of potassium with oxygen: Potassium metal forms potassium oxide when reacts with oxygen.  $4\text{K} + \text{O}_2 \rightarrow 2\text{K}_2\text{O}$

- Reaction of sodium with oxygen: Sodium metal forms sodium oxide when reacts with oxygen.  $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$

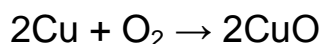
Lithium, potassium, sodium, etc. are known as alkali metals. Alkali metals react vigorously with oxygen.

- 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.

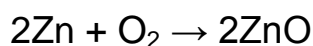


Iron fillings give sparkle in flame when burnt.

- Reaction of copper metal with oxygen: Copper does not react with oxygen at room temperature but when burnt in air, it gives copper oxide.



- Reaction of zinc metal with oxygen: Zinc does not react with oxygen at room temperature. But it gives zinc oxide when heated strongly in air.



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