

CHAHAL COACHING CENTRE –C3

Class 8th Chapter (Materials : Metal and Non- metal)

Physical Properties of Metals:

- 1. Hardness:** Metals exhibit a characteristic solidity and resistance to deformation. For instance, iron is used to construct sturdy structures such as bridges and buildings due to its hardness.
- 2. Luster:** Metals have a property known as metallic lustre, which makes them appear shiny and reflective when polished. Gold is an excellent example of a metal that showcases a brilliant lustrous shine.
- 3. Malleability:** Malleability refers to the ability of metals to be hammered or rolled into thin sheets without breaking. Aluminium, for instance, can be rolled into sheets thin enough to create aluminium foil for various purposes.
- 4. Ductility:** Ductility is the capacity of metals to be drawn into thin wires without breaking. Copper possesses high ductility, and this property is exploited in making electrical wires.
- 5. Sonorous:** Metals produce a characteristic ringing sound when struck. This property is utilised in crafting musical instruments like bells, where bronze (an alloy of metals) is favoured for its sonorous quality.
- 6. Good Conductors of Heat and Electricity:** Metals possess high thermal and electrical conductivity, allowing heat and electricity to flow through them with minimal resistance. Copper, due to its excellent conductivity, is extensively used in electrical wiring and circuitry.

Chemical Properties of Metals:

- 1. Reaction with Oxygen:** Many metals react with oxygen in the air to form metal oxides. This process is commonly referred to as oxidation. Iron, when exposed to oxygen and moisture, undergoes a chemical change known as rusting, where iron oxide (rust) is formed.
- 2. Reaction with Water:** Certain reactive metals, such as sodium and potassium, exhibit a vigorous reaction with water. Sodium, upon contact with water, releases hydrogen gas and forms sodium hydroxide, which is highly alkaline.
- 3. Reaction with Acids:** Metals react with acids to produce hydrogen gas and form salts. For instance, zinc reacts with hydrochloric acid to yield zinc chloride and hydrogen gas.
- 4. Reaction with Bases:** When metals react with bases, they produce hydrogen gas and form compounds called metalates. Aluminum's reaction with sodium hydroxide (a base) results in the formation of sodium aluminate and hydrogen gas.

5. Displacement Reaction: This type of reaction occurs when a more reactive metal displaces a less reactive metal from its compound. Zinc, being more reactive, can displace copper from copper sulphate solution: $\text{Zinc} + \text{Copper Sulfate} \rightarrow \text{Zinc Sulfate} + \text{Copper}$.

6. Uses of Metals and Non-metals: Metals find extensive application in various industries; iron is used in construction, aluminium in packaging, etc. Non-metals like carbon are essential for life (organic compounds), while sulphur is utilised in making matches.

7. Metalloids: Metalloids possess properties intermediate between metals and non-metals. Silicon, for instance, has characteristics of both metals and non-metals and is vital in the electronics industry.

Non-metals:

1. Dull Appearance, Poor Conductors: Non-metals lack the metallic shine and are generally insulators. Carbon, found in non-metallic forms like graphite, is an excellent example.

2. Reaction with Oxygen: Non-metals, like sulphur, react with oxygen to form non-metal oxides. Sulphur, when burnt, reacts with oxygen in the air to produce sulphur dioxide (SO_2).

3. No Reaction with Water: Non-metals usually do not react with water. For example, carbon and sulphur do not react with water even when exposed to it for an extended period.

4. No Reaction with Acids: Unlike metals, most non-metals do not react with acids. Non-metals like carbon and sulphur remain relatively unaffected when brought into contact with common acids.

5. No Reaction with Bases: Similar to acids, non-metals typically do not react with bases. They do not form products like salts and hydrogen gas upon reaction with bases.

6. Uses of Non-metals: Non-metals are crucial for various purposes. Oxygen, a non-metal, is essential for respiration, while nitrogen is a key component of fertilisers that promote plant growth.