

# Chapter 3: Metals and Non-Metals

CBSE Class 10 Science Notes

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## 1. Physical Properties of Metals and Non-Metals

### Metals

- **Lustrous** (shiny surface)
- **Hard** (except sodium and potassium)
- **Good conductors** of heat and electricity
- **Malleable** (can be hammered into sheets)
- **Ductile** (can be drawn into wires)
- **Sonorous** (produce sound when struck)
- **High melting and boiling points**

### Non-Metals

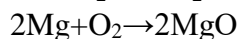
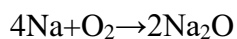
- **Dull** (non-lustrous)
  - **Brittle** (breaks on hammering)
  - **Poor conductors** of heat and electricity (except graphite)
  - **Not malleable or ductile**
  - **Low melting and boiling points**
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## 2. Chemical Properties of Metals

### (a) Reaction with Oxygen

Metals react with oxygen to form **metal oxides**.

Example:

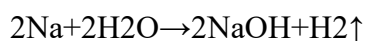


- Metal oxides are **basic** in nature.

### (b) Reaction with Water

Metals form **metal hydroxide** and release **hydrogen gas**.

Example:

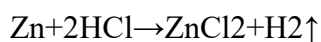


- Magnesium reacts with hot water.
- Iron reacts with steam.
- Copper, silver, gold do not react with water.

### (c) Reaction with Acids

Metals react with dilute acids to produce **salt and hydrogen gas**.

Example:

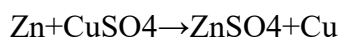


**Note:** H<sub>2</sub> gas burns with a 'pop' sound.

### (d) Reaction with Other Metal Salts (Displacement Reaction)

A more reactive metal displaces a less reactive metal.

Example:



## 3. Reactivity Series of Metals

A list of metals arranged in **decreasing order of reactivity**:

**K > Na > Ca > Mg > Al > Zn > Fe > Pb > Cu > Hg > Ag > Au**

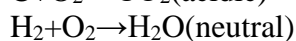
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## 4. Properties of Non-Metals

### (a) Reaction with Oxygen

Non-metals form **acidic or neutral oxides**.

Example:



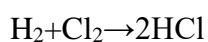
### (b) Reaction with Water/Acids

Non-metals **do not react** with water or acids as they do not lose electrons easily.

### (c) Reaction with Chlorine

Non-metals react with chlorine to form **covalent chlorides**.

Example:



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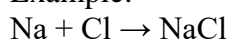
## 5. Ionic Compounds

### Formation

Formed by **transfer of electrons** from metals to non-metals.

- Metal loses electrons → forms **cation**
- Non-metal gains electrons → forms **anion**

Example:



### Properties

- **Hard and brittle**
  - **High melting and boiling points**
  - Conduct electricity in **molten** or **aqueous state**
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## 6. Occurrence of Metals

- Found in earth's crust as **minerals**
- **Ores**: Minerals from which metals are extracted profitably

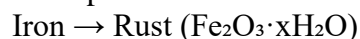
### Steps in Metallurgy:

1. **Enrichment of ore** (removal of impurities)
  2. **Extraction** of metal from ore
    - **Calcination** (heating in absence of air)
    - **Roasting** (heating in presence of air)
  3. **Reduction** (by carbon, displacement, electrolysis)
  4. **Refining** (electrolytic refining)
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## 7. Corrosion

Gradual destruction of metals by reacting with air and moisture.

Example:



Prevention:

- Painting
- Galvanization
- Oiling
- Alloying

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## 8. Alloys

A mixture of **two or more metals** or **metal + non-metal**.

- Improves strength, hardness, resistance  
Example:
- **Brass** = Copper + Zinc
- **Bronze** = Copper + Tin
- **Stainless steel** = Iron + Chromium + Nickel