

27. Metals and Non-metals

- Elements are broadly classified as metals non-metals.
- Metals can be distinguished from non-metal on the basis of their physical properties like malleability ductility, lusture etc.
- Metals have tendency to lose electrons whereas non-metal have tendency to gain electrons. Thus metals show electropositive character whereas non-metals show electronegative character.
- An ore is a mineral from which a metal can be profitably extracted from it.
- Metallurgy is the branch of science which deals with extraction of metals from its ores.
- Some of the non-metals are also found in free state in nature for example sulphur and carbon (as coal, graphite, diamond).
- Chemical properties of metals and non-metal are different. Metal and non-metal both react with oxygen (air), water and acids.
- Certain oxides of metals show both the properties acidic as well as basic e.g. ZnO and Al_2O_3 .

Build Your Understanding

Physical Properties of metals and non-metals

Physical Properties	Metals	Non-Metals
Malleability and Ductility	Metals are malleable. They can be beaten into thin sheets. They are also ductile and can be drawn into wire	Non-metals are neither malleable nor ductile. Fore.g. coal, (carbon) and sulphur
Metallic Lusture	show metallic lusture.	Do not show any metallic lusture except I_2 .
Hardness	Hard except Hg, Na	Soft except diamond
Physical state	solid and liquid states	Solid, liquid and gas
Sonorous	Sonorous (produce sound)	Non-sonorous
Density	High	Low
Electrical conductivity	Good conductor	Bad conductor

Chemical Properties of Metals

1. Reaction with Oxygen: Form oxides which are basic in nature
Oxides of aluminium (Al_2O_3), zinc (ZnO), tin (SnO) and iron (Fe_2O_3) are amphoteric. React with acids as well as with bases.

2. Reaction with acids: Generally metals react with acids to form salts and evolved H_2



3. Reaction with water to form base

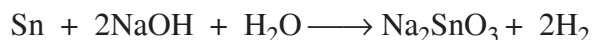


Al or Fe react with steam to form oxides



4. Reaction with bases

Al, Sn and Zn react with common base



Corrosion: Oxygen reacts with metals to form oxides. Oxidation of metals is known corrosion for example rusting of iron.



Presence of moisture and oxygen is necessary for corrosion. Corrosion can be prevented by (i) Painting (ii) oiling and greasing (iii) Galvanization (iv) Alloying

Uses of Metals

- To make utensils (iron, aluminium)
- To make electrical wire (copper, aluminium)
- to make machines
- uses in cells and batteries
- to make Jewellery
- To make sheets Al and iron are used to make sheet due to malleable nature (Malleability)

Uses of Non-metals

- For the manufacture of fertilizer
- Silicon is used for making transistor, chips etc
- White phosphorous is used in match industry
- Sulphur is used to control fungus pests. It is also used for the manufacture of H_2SO_4 and gun powder.



Stretch Yourself

1. Why is it better to use copper than carbon in electrical wires.
2. Aluminium metals is used as utensils in houses why?
3. Left copper coin in open air and observed. After one month a green layer is developed on the coin. Why it is so?



Test Yourself

1. Metals are good conductor of electricity but non-metal are not why?
2. What are the main conditions for the corrosion? How will you prevent it?
3. How will you prove that metal oxides are basic but non-metal oxides are acidic in nature?
4. Sn is soluble in excess NaOH why? Explain with equation.