ಎಸ್ಎಸ್ಎಲ್ಸಿ–ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ

SCIENCE

METALS AND NON-METALS

Answer the following questions

23. Give some important chemical properties of metals.

Ans:- (…….Contd)

Silver and gold do not react with oxygen even at high temperature.

ii] Reaction with water: More reactive metals react with water at room temperature but less reactive metals react on heating with water or steam. Hydrogen is formed in all these cases.

Sodium and potassium react with water at room temperature very briskly and forms sodium hydroxide and hydrogen gas is evolved.

$$2Na + 2H_2O \rightarrow \underset{\text{Sodium hydroxide}}{2NaOH} + H_2$$

Magnesium and calcium react slowly with cold water but react rapidly with boiling water but metals like aluminium, iron and zinc do not react with water, they react with steam.

$$Mg + H_2O \rightarrow \underset{\text{Magnesium oxide}}{MgO} + H_2$$
(Boiling Water)

$$Zn + H_2O(\text{Steam}) \rightarrow \underset{\text{Zinc oxide}}{ZnO} + H_2$$

$$3Fe + 4H_2O\,(\text{Steam}) \rightarrow \underset{\text{Magnetic oxide of iron}}{Fe_3O_4} + 4H_2$$

Metals like lead, copper, silver and gold do not react even with steam.

iii] Reaction with dilute acids: Many metals react with dilute acids to give metal salts and hydrogen. The rate of effervescence of hydrogen depends on the reactivity of the metal. Higher rate of effervescence means higher reactivity of the given metal. The reactions of metals with dilute hydrochloric acid and dilute sulphuric acid are similar. With dilute hydrochloric acid [HCl] they give metal chlorides and hydrogen; with dilute sulphuric acid [H_2SO_4], they give metal sulphates and hydrogen. Nitric acid is an oxidizing agent, so it reacts differently. Mg and Mn with dil HNO_3 to evolve H_2 gas.

$$2Na + 2HCl \rightarrow \underset{\text{Sodium chloride}}{2NaCl} + H_2$$

$$Mg + 2HCl \rightarrow \underset{\text{Magnesium chloride}}{MgCl_2} + H_2$$

$$Zn + 2HCl \rightarrow \underset{\text{Zinc chloride}}{ZnCl_2} + H_2$$

$$Fe + 2HCl \rightarrow \underset{\text{Iron chloride}}{FeCl_2} + H_2$$

Less reactive metals like copper, silver, gold do not react with dilute HCl.

iv] Reaction with hydrogen: The metals do not combine with hydrogen. The more reactive metals such as sodium, calcium react with hydrogen to form metal hydrides.

$2Na + H_2 \rightarrow 2NaH$ (Sodium hydride)

$Ca + H_2 \rightarrow CaH_2$ (Calcium hydride)

Magnesium and copper form hydrides with difficulty.

v] Reaction with halogens: Metals react with chlorine to give metal chlorides.

$$2Na + Cl_2 \xrightarrow{\text{heat}} \underset{\text{Sodium chloride}}{2NaCl}$$

$$Mg + Cl_2 \xrightarrow{\text{heat}} \underset{\text{Magnesium chloride}}{MgCl_2}$$

$$2Fe + 3Cl_2 \xrightarrow{\text{heat}} \underset{\text{Ferric chloride}}{2FeCl_3}$$

$$Cu + Cl_2 \xrightarrow{\text{heat}} \underset{\text{Cupric chloride}}{CuCl_2}$$

vi] Reaction with sulphur. Metals react with sulphur to give their metal sulphides.

$2Na + S \rightarrow N_2S$ (Sodium sulphide)

$Mg + S \rightarrow MgS$ (Magnesium sulphide)

$Fe + S \rightarrow FeS$ (Iron sulphide)

$Cu + S \rightarrow CuS$ (Copper sulphide)

$Zn + S \rightarrow ZnS$ (Zinc sulphide)

vii] Displacement of metals from their salt solutions: The more reactive metals displace the less reactive metals from their salt solutions. If we take a solution of copper sulphate ($CuSO_4$) and put a strip of iron metal in this solution, the blue colour of copper sulphate solution fades gradually and iron metal is deposited on the zinc strip.

$$Fe(s) + \underset{\substack{\text{Copper sulphate}\\\text{(Blue solution)}}}{Cu^{2+}SO_4^{2-}} \rightarrow \underset{\substack{\text{Ferrous sulphate}\\\text{(Green solution)}}}{Fe^{2+}SO_4^{2-}} + Cu(s)$$

If we dip copper wire in ferrous sulphate solution; no reaction will be observed. This means that iron is more reactive than copper.

If we put gold or platinum in a copper sulphate solution, then copper is not displaced because both gold and platinum are less reactive than copper and do not give electrons to reduce copper ions into copper metals.

Some more questions:-

1. Given 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 the poor conductor of heat.

Ans:- i] Mercury, ii] Sodium, iii] Silver, iv] Lead.

2. Explain the meanings of malleable and ductile.

Ans:- Malleable is the property by which metals can be beaten into sheets with hammering without returning to previous condition.

Ductile is the ability of metals to be drawn into thin wires.

3. Give the colour of the flame of some metals.

Ans:-

Sl. No.	*Metal*	*Colour of flame*	*Appearance of metal surface*
1.	Copper (Cu)	Green-blue	Black
2.	Iron (Fe)	No colour	Reddish
3.	Sodium (Na)	Yellow	White
4.	Magnesium(Mg)	White light	White
5.	Calcium (Ca)	Brick red colour	White
6.	Zinc (Zn)	No colour	White
7.	Aluminium (Al)	White flame	White

4. Name the metals which has –

(a) the lowest density (b) the highest density

Ans:- (a) Lithium – the lightest metal

(b) Iridium – the heaviest metal

5. Name the metal which shows properties of non-metals but is also present in the activity series of metals.

Ans:- Hydrogen is the metal which shows properties of non-metals but is also present in the activity series of metals

6. Why are aluminum and copper metals used for making cooking vessels?

Ans:- Aluminum and copper metals are good conductors of heat. When exposed to air, these develop in a layer of oxide. This makes it resistant to further corrosion.

7. The way metals like sodium, magnesium and iron react with air and water is an indication of their relative positions in the 'reactivity series'. Is the statement true? Justify your answer with examples.

Ans:- Relative reactivity of Na, Mg and Fe can be judged by their reaction with air and water.

Sodium reacts vigorously with oxygen or water at room temperature.

(Contd…..)