ಎಸ್ಎಸ್ಎಲ್ಸಿ–ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ

SCIENCE

METALS AND NON-METALS

Answer the following questions

27. Though non-metals are small in number, their presence is vital for the existence of life. Comment.

Ans:- Non-metals form the major constitutions of air, ocean and earth. Main constituents of air are oxygen and nitrogen. Chlorine occurs in the ocean as chlorides. Earth's crust contains non-metals like oxygen, silicon, phosphorus and sulphur in order of their abundance.

28. In nature aluminum is found in the form of its compounds while gold is found in free state. Give reasons.

Ans:- Aluminium finds place higher up in the activity series and is thus quite reactive and is found as compounds in nature while gold is just at the bottom in the activity series and is thus least reactive. It is thus found in free state in nature.

29. Give any three differences between the properties of sodium and silicon.

Ans:- Differences between properties of sodium and silicon are:

Sodium	*Silicon*
* It shows metallic luster	* It is brittle.
*It forms basic oxide, Na_2O.	* It forms acidic oxides, SiO_2.
* With Cl_2, it gives electrovalent chloride.	* With Cl_2, it forms covalent chloride.

30. What are amphoteric oxides? Give examples.

Ans:- Such oxides which react with both acids and bases to give salt and water are called amphoteric oxides, e.g., aluminium oxide and zinc oxide.

$Al_2O_3 + 6HCl \rightarrow 2ACl_3 + 3H_2O$

$Al_2O_3 + 2NaOH \rightarrow \underset{\text{Sodium aluminate}}{2NaAlO_2} + H_2O$

31. Mention some chemical properties of non-metals.

Ans:- General characteristics of non-metals are –

i] **Non-metals are electronegative elements:** The non-metals have the tendency to accept electrons and form negatively charged ions, so non-metals are called electronegative elements. e.g., oxygen is a non-metal which gives negative oxide ions, O^{2-}; chlorine is a non-metal which gives negatively charged chloride ions, Cl^-.

ii] **Reaction with oxygen:** With oxygen non-metals form acidic oxides which when dissolved in water give acids. However, some oxides are neutral also. For example:

a] Carbon gives carbon dioxide which is acidic and gives carbonic acid on reaction with water.

$C(s) + O_2(g) \rightarrow CO_2(g)$

$CO_2(g) + H_2O(l) \rightarrow \underset{\text{Carbonic acid}}{H_2CO_3(l)}$

b] Similarly, sulphur gives sulphur trioxide which on reaction with water gives sulphuric acid.

$2S(s) + 3O_2(g) \rightarrow 2SO_3(g)$

$SO_3(g)\ H_2O(l) \rightarrow \underset{\text{Sulphuric acid}}{H_2SO_4(aq)}$

C] Oxides like CO, N_2O etc., are neutral. They do not give acidic test with moist litmus paper.

iii] **Reaction with water:** Non-metals do not react with water or steam to evolve hydrogen gas. This is because non-metals cannot donate electrons to reduce hydrogen ions of water to produce hydrogen gas.

iv] **Reaction with acids:** Like metals, non-metals do not react with acids. A non-metal being an electron acceptor does not supply electron to H^+ ions and thus cannot react with acids.

v] **Reaction with hydrogen:** Non-metals, in general, combine with hydrogen to form hydrides (binary) which are covalent compounds. For example, water (H_2O); hydrogen sulphide (H_2S), ammonia (NH_3), and hydrochloric acid (HCl) are well known hydrides.

$O_2(g) + 2H_2(g) \rightarrow 2H_2O(g)$

$S(s) + H_2(g) \rightarrow H_2S(g)$

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

$Cl_2(g) + H_2(g) \rightarrow 2HCl(g)$

vi] **Reaction with chlorine:** Non-metals react with chlorine to form their respective covalent chlorides which are non-electrolytes. These are formed by sharing of electrons and thus are covalent compounds (chlorides). For example, carbon tetrachloride (CCl_4), and phosphorus pentachloride (PCl_5).

vii] Reaction with salt solutions: A more reactive non-metal displaces a less reactive non-metal from its salt solution. For example, when chlorine is passed through a solution of potassium bromide, then potassium chloride and bromine are formed.

$$\underset{\text{Potassium bromide}}{KBr(aq)} + \underset{\text{Chlorine}}{Cl_2(g)} \rightarrow \underset{\text{Potassium chloride}}{KCl(aq)} + \underset{\text{Bromine}}{Br_2(l)}$$

viii] **Non-metals are oxidizing agents:** Non-metals act as oxidizing agents as these can accept electron/s from other substances and are themselves reduced.

$Cl_2 + 2e^- \rightarrow 2Cl^-$

Chlorine is thus reduced to chloride.

32. State three reasons to believe that carbon is a non-metal

Ans:- i] Carbon is brittle.

ii] Carbon forms covalent compounds and carbide ions (negatively charged).

iii] Carbon forms an acidic oxide (CO_2).

33. Give reason:

i] Ionic compounds have high melting point.

ii] Ionic compounds are hard crystalline solids.

Ans:- i] In ionic compounds, ions are joined together due to powerful electrostatic forces, therefore, considerable energy is required to separate these ions and break the lattice. Thus ionic compounds have high melting points.

ii] There are solids due to strong force of attraction between oppositely charged ions resulting in the formation of hard time lattice.

34. Give an account of important characteristics of Electrovalent/Ionic compounds.

Ans:- The important characteristic properties of Electrovalent compounds are

1) Ionic compounds consist of ions: All ionic compounds consist of positively and negatively charged ions and not molecules. In the crystal of sodium chloride every sodium ion is surrounded by six evenly spaced chloride ions and vice-versa in a regular fashion. Similarly, in potassium nitrate, the units of the crystal are the potassium and the nitrate ions.

(Contd…….)