Full Test -Dose 3 | Chemistry X| All chapters I Time: 1.5h I Marks- 35

Q.1. Write the molecular formula of ethene and draw its electron dot structure. **(2 Marks)**

Q.2. Given reasons:

(a) Platinum, gold and silver are used to make jewellery.

(b) Metals like sodium and potassium are stored under oil. **(2 Marks)**

Q. 3. Silver articles become black when kept in open for some time, whereas copper vessels lose their shiny brown surfaces and gain a green coat when kept in open. Name the substances present in air with which these metals react and write the name of the products formed. **(2 Marks)**

Q.4. On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O_2 and a brown gas X is formed.

(a) Identify the type of reaction and gas X.

(b) Write the balanced chemical equation of the reaction.

(c) Write the pH range of aqueous solution of the gas X. **(3 Marks)**

Q.5. (a) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

(b) Dry hydrogen chloride gas does not change the colour of dry litmus paper why? **(2 Marks)**

Q.6. How is sodium hydroxide manufactured in industries? Name the process. In this process, a gas X is formed as a byproduct. This gas reacts with lime water to give a compound Y, which is used as a bleaching agent in the chemical industry. Identify X and Y and write the chemical equation of the reaction involved. **(2 Marks)**

Q.7. What are amphoteric oxides? Give an example. Write balanced chemical equations to justify your answer. **(2 Marks)**

Q.8. What is a homologous series of carbon compounds ? Give an example and list its three characteristics. **(2 Marks)**

Q.9. What is observed when a pinch of sodium hydrogen carbonate is added to 2 mL of acetic acid taken in a test tube? Write chemical equation for the reaction involved in this case. **(2 Marks)**

Q.10. Give reason:

(a) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

(b) Aluminium is a highly reactive metal; still, it is widely used in making cooking utensils. **(2 Marks)**

Q.11. During the reaction of some metals with dilute hydrochloric acid, the following observations were made by a student:

(a) Silver does not show any change.

(b) Some bubbles of gas are seen when a lead is reacted with the acid.

(c) The reaction of sodium is found to be highly explosive.

(d) The temperature of the reaction mixture rises when aluminium is added to the acid.

Explain these observations giving an appropriate reason **(4 Marks)**

Q.12. Given below are the steps for the extraction of copper from its ore. Write the chemical equation of the reactions involved in each case.

(i) Roasting of copper (I) sulphide.

(ii) Reduction of copper (I) oxide from copper (I) sulphide

(iii) Electrolytic refining (**3 Marks)**

Q.13. Which compounds are called (i) alkanes, (ii) alkenes and (iii) alkynes? C_4H_{10} belongs to which of these? Draw two structural isomers of this compound. **(3 Marks)**

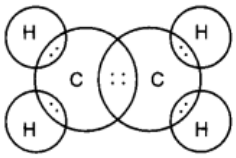
Q.14. Name a metal of medium reactivity and write three main steps in the extraction of this metal from its sulphide ore. (2 Marks)

Q.15. List two chemical properties on the basis of which ethanol and ethanoic acid may be differentiated and explain how **(2 Marks)**

Solution

1. The molecular formula of ethene is C_2H_4

Electron dot structure of ethene.



or $CH_2 = CH_2$

2. (a) Platinum, gold and silver are used to make jewellery because of its bright and shiny surface. This property is called metallic lustre.

(b) Metals like sodium and potassium are stored under oil because they are very reactive in nature, they react with oxygen present in air. Thus, to prevent their oxidation they are kept in the oil.

3. Silver articles reacts with sulphur compounds such as hydrogen sulphide present in the air to form silver sulphide (Ag_2S) whereas copper reacts slowly with CO_2 and water present in the air to form green coating of mixture of copper carbonate and copper hydroxide

4. (a) Decomposition reaction, the gas X is Nitrogen dioxide (NO_2)

(b) $2Cu(NO_3)_2.3H_2O \rightarrow 2CuO + 4NO_2 + O_2 + 6H_2O$

(Blue) (Black)

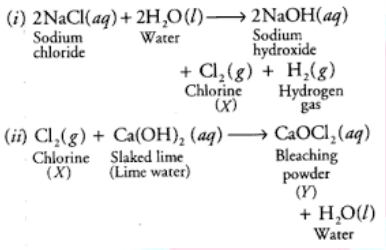
(c) Oxides of non-metals are acidic. Therefore, the aqueous solution of this gas would be acidic.

The pH would be less than 7

5. (a.) The process of mixing concentrated acid with water is highly exothermic. So, when a concentrated acid is added to water then heat is easily absorbed by a large amount of water.

(b) Dry hydrogen chloride does not contain any hydrogen ions in it, so it does not show acidic behaviour and thus does not change the colour of dry litmus paper.

6.



7. Those oxides which behave both acidic and basic oxides are called amphoteric oxides.

Example: Al_2O_3 (Alumina)

1. $Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$
   Alumina Acid Salt
2. $Al_2O_3 + 2NaOH \longrightarrow 2NaAlO_2 + H_2O$
   Alumina Base Salt

8. A homologous series is a group of organic compounds having similar structures and similar chemical properties in which the successive compounds differ by CH_2 group.

Example: Alkanes with general formula C_nH_{2n+2}

Characteristics:

- All the members of a homologous series can be represented by the same general formula.
- Any two adjacent homologues differ by 1 carbon atom and 2 hydrogen atoms in their molecular formulae.
- The difference in the molecular masses of any two adjacent homologues is 14 u.

9. CO2 gas is evolved with brisk effervescence when sodium hydrogen carbonate is added to acetic acid.

$$\underset{\text{Sodium hydrogen carobonate}}{NaHCO_3} + \underset{\text{Acetic acid}}{CH_3COOH} \longrightarrow \underset{\text{Sodium acetate}}{CH_3COONa} + H_2O + CO_2$$

10. (a) Carbonate and sulphide ores are usually converted into oxides during the process of extraction because obtaining a metal from its metal oxide is much easier than from metal carbonates and sulphides.

(b) Aluminium is highly reactive metal still it is widely used in making cooking utensils because it reacts with O_2 present in air to from aluminium oxide that forms a protective layer and protects the metal from corrosion.

(a) Silver is covered with a thin layer of silver chloride, so it does not react with dilute hydrochloric acid.

$$\underset{\text{Silver}}{Ag} + \underset{\substack{\text{(dil.)}\\ \text{Hydrochloric acid}}}{HCl} \rightarrow \text{No Reaction}$$

(b) Bubbles of hydrogen gas are evolved when lead is reacted with the acid.

$$\underset{\text{Lead}}{Pb} + \underset{\substack{\text{(dil.)}\\ \text{Hydrochloric acid}}}{2HCl} \rightarrow \underset{\substack{\text{Lead}\\ \text{chloride}}}{PbCl_2} + \underset{\text{Hydrogen}}{H_2}$$

(c) The reaction of sodium is found to be highly explosive because sodium is very reactive in nature.

$$\underset{\text{Sodium}}{2Na(s)} + \underset{\substack{\text{Hydrochloric}\\ \text{acid}}}{2HCl\,(aq)} \rightarrow \underset{\substack{\text{Sodium}\\ \text{chloride}}}{2NaCl\,(aq)} + \underset{\text{Hydrogen}}{H_2\,(g)}$$

(d) The temperature of the reaction mixture rises when aluminium is added to the acid because the reaction is highly exothermic in nature.

$$\underset{\text{Aluminium}}{2Al\,(S)} + \underset{\substack{\text{Hydrogen}\\ \text{chloride}}}{6HCl\,(aq)} \rightarrow \underset{\substack{\text{Aluminium}\\ \text{chloride}}}{2AlCl_3\,(aq)} + \underset{\text{Hydrogen}}{3H_2\,(g)}$$

12.

(i) $2Cu_2S\ (s) + 3O_2\ (g) \xrightarrow{\text{Roasting}}$

Copper(I) sulphide (Copper glance ore) — Oxygen (From air)

$2Cu_2O\ (s) + 2SO_2\ (g)$

Copper (I) oxide — Sulphur dioxide

(ii) $2Cu_2O\ (s) + Cu_2S\ (s) \xrightarrow{\text{Heat}}$

Copper(I) oxide — Copper(I) sulphide

$6Cu\ (s) + SO_2\ (g)$

Copper metal — Sulphur dioxide

(iii) 1. At cathode :

$Cu^{2+} + 2e^- \rightarrow Cu$

Copper ion (From electrolyte) — Electrons (From cathode) — Copper (Deposits on cathode)

2. At anode :

$Cu - 2e^- \rightarrow Cu^{2+}$

Copper atom (From impure anode) — Electrons (Given to anode) — Copper ion (Goes into electrolyte)

13. (i) The hydrocarbons in which carbon atoms are connected by only single covalent bonds are called alkanes.

(ii) The hydrocarbons in which carbon atoms are connected by the double bond are called alkene.

(iii) The hydrocarbons in which carbon atoms are connected by the triple bond are called alkynes.

C_4H_{10} belongs to alkane

Structural Isomers of C_4H_{10} :

$CH_3-CH_2-CH_2-CH_3$ **(a)**

$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_3$ **(b)**

14. Zinc

The steps involved in the extraction of zinc from zinc sulphide are:

1. Roasting of sulphide ore in the presence of air to convert it into metal oxide.

$2\ ZnS\ (s) + 3O_2\ (g) \xrightarrow{\text{Roasting}}$

Zinc sulphide — Oxygen

$2\ ZnO\ (s) + 2\ SO_2\ (g)$

Zinc oxide — Sulphur dioxide

2. Reduction of metal oxide with carbon to get free metal.

$$\underset{\text{Zinc oxide}}{ZnO\,(s)} + \underset{\text{Carbon}}{C(s)} \rightarrow \underset{\text{Zinc}}{Zn\,(s)} + \underset{\text{Carbon-monoxide}}{CO\,(g)}$$

3. Refining of impure metal to get pure metal.

15. 1. Ethanol does not react with sodium bicarbonate but ethanoic acid reacts with sodium bicarbonate releasing CO2 gas.

2. Ethanol does not change the colour of blue litmus paper but ethanoic acid changes the colour of blue litmus to red due to presence of carboxylic acid group.