

ICSE Board
Class X Chemistry
Sample Paper – 13 Solution

SECTION I

Answer 1

(a)

- i. Substances which conduct electricity in the solid state are generally metals.
- ii. The electron-releasing tendency of zinc is more than that of copper.
- iii. Pure water consists entirely of molecules.
- iv. We can expect that pure water will not normally conduct electricity.
- v. Electrolysis is the passage of electricity through a liquid or solution accompanied by a chemical change.

(b)

- i. Barium oxide
- ii. Sodium hydroxide
- iii. Manganese oxide
- iv. Cupper hydroxide
- v. Carbonic acid

(c)

- i. (a) Silver nitrate and lead nitrate
- ii. (b) On the right hand side of the periodic table
- iii. (a) Greenish yellow flame
- iv. (b) Ostwald process
- v. (b) 450°–500°C

(d)

- i. The hydrocarbon which is tetrahedral is methane.
- ii. The hydrocarbon which is a planar molecule is ethene.
- iii. The hydrocarbon which is a linear molecule is ethyne.
- iv. The hydrocarbon which forms a red precipitate with ammoniacal solution of copper chloride is acetylene.
- v. Alkanes are also called paraffins.

(e)

S No	Formula	Common Name	IUPAC
1.	C ₃ H ₆	Propylene	Propene
2.	C ₂ H ₄	Ethylene	Ethene
3.	C ₂ H ₂	Acetylene	Ethyne
4.	CH ₃ OH	Methyl alcohol	Methanol
5.	C ₂ H ₅ OH	Ethyl alcohol	Ethanol

(f)

- $3\text{CuO} + 2\text{NH}_3 \rightarrow 3\text{Cu} + 3\text{H}_2\text{O} + \text{N}_2$
- $\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HCl}$
- $2\text{FeCl}_2 + \text{Cl}_2 \rightarrow 2\text{FeCl}_3$
- $2\text{NH}_4\text{Cl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3$
- $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$

(g)

- Polar covalent bond
- Ionic bond
- O and H are bonded with **a single covalent bond** and oxygen possesses a single negative charge in the hydroxyl ion.
- Covalent bond
- Coordinate bond

(h)

- A reddish brown precipitate is obtained when ammonium hydroxide is added to ferrous chloride.
- Aqueous ammonia is a solution of NH₃.
- Finely divided iron is used in the Haber process.
- Quicklime (CaO) is a drying agent for NH₃.
- Ammonium salts, on thermal decomposition, give ammonia and hydrogen chloride.

SECTION II**Answer 2****(a)**

- i. A metal of valency one = 19
- ii. A solid non-metal of period 3 = 15
- iii. A rare gas = 2
- iv. A gaseous element with valency 2 = 8
- v. An element of group 2 = 4

(b)

- i. Electrovalent compounds are good conductors of electricity in the fused or aqueous state because electrostatic forces of attraction between ions in the solid state are very strong, and these forces weaken in the fused state or in the solution state. Hence, ions become mobile.
- ii. Electrovalent compounds have a strong force of attraction between the oppositely charged ions, so a large amount of energy is required to break the strong bonding force between ions. So, they have high boiling and melting points. Covalent compounds have weak forces of attraction between the binding molecules, thus less energy is required to break the force of binding. So, they have low boiling and melting points.
- iii. As water is a polar compound, it decreases the electrostatic forces of attraction, resulting in free ions in the aqueous solution. Hence, electrovalent compounds dissolve. Covalent compounds do not dissolve in water but dissolve in organic solvents. Organic solvents are non-polar; hence, these dissolve in non-polar covalent compounds.
- iv. Electrovalent compounds are usually hard crystals yet brittle because they have strong electrostatic forces of attraction between their ions which cannot be separated easily.
- v. Polar covalent compounds conduct electricity because they form ions in their solutions.

Answer 3

(a)

i.

Element	% at. mass	atomic ratio	simple ratio
C	54.54%,	$\frac{54.54}{12}$	4.545
H	9.09%,	$\frac{9.09}{1}$	9.09
O	36.36%	$\frac{36.36}{16}$	2.2725

So, its empirical formula = C_2H_4O

ii.

ii. Empirical formula mass = 44

Since, vapour density = 44

So, molecular mass = $2V.D = 88$

Or $n = 2$

so, molecular formula = $(C_2H_4O)_2 = C_4H_8O_2$

(b)

i. $NH_4NO_3 \rightarrow N_2O + 2H_2O$

1 mole 1 mole 2 mole
1 V 1 V 2 V

44.8 litres of water is produced by 22.4 litres of NH_4NO_3 .

So, 8.96 litres will be produced by $\frac{22.4 \times 8.96}{44.8}$

= 4.48 litres of NH_4NO_3

So, 4.48 litres of N_2O is produced.

ii. 44.8 litres H_2O is produced by 80 g of NH_4NO_3 .

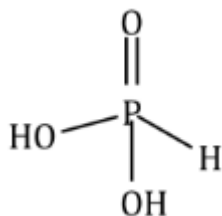
So, 8.96 litres H_2O will be produced by $\frac{80 \times 8.96}{44.8}$

= 16g NH_4NO_3

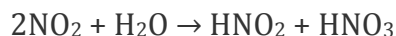
iii. % of O in $NH_4NO_3 = 3 \times 16 / 80 = 60\%$

(c)

- i. Carbonic acid is a dibasic acid with two replaceable hydrogen ions; therefore, it forms one acid salt or one normal salt. Hydrochloric acid is a monobasic acid with one replaceable hydrogen ion, and so forms only one normal salt.
- ii. Strength of an acid is the measure of concentration of hydronium ions it produces in its aqueous solution. Dil. HCl produces high concentration of hydronium ion compared to that of concentrated acetic acid. Thus, dil. HCl is a stronger acid than highly concentrated acetic acid.
- iii. H_3PO_3 is not a tribasic acid because in oxyacids of phosphorus, hydrogen atoms which are attached to oxygen atoms are replaceable. Hydrogen atoms directly bonded to phosphorus atoms are not replaceable.



- iv. The salt produced is insoluble in the solution, so the reaction does not proceed. Hence, we do not expect lead carbonate to react with hydrochloric acid.
- v. NO_2 is called double acid anhydride because two acids—nitrous acid and nitric acid—are formed when it reacts with water.



Answer 4

(a)

- i. Used for illuminating country houses: Ethyne
- ii. Used for making a household plastic material: Ethyne
- iii. Called 'wood spirit': Methanol
- iv. Poisonous: Methanol
- v. Consumed as a drink: Ethanol

(b)

- i. Aluminium being a strong, light and corrosion-resistant metal is used for making alloys.
- ii. Aluminium is light, malleable and does not rust, so it is used for wrapping chocolates.
- iii. Painting electric and telegraphic poles to prevent them from rusting.
- iv. It is used in aluminothermy as it is a good reducing agent.
- v. As aluminium forms a film of aluminium oxide, it protects ships from corrosion. So it is used for making ships.

Answer 5

(a)

- i. Electrolyte
- ii. Nickel
- iii. Cathode
- iv. Anode
- v. Cations

(b)

- i. The gas is ammonia.
- ii. The formula is NH_3 .
- iii. Uses of ammonia:
 - a. It is used in the industrial preparation of nitric acid by the Ostwald process.
 - b. It is used in the manufacture of fertilisers such as ammonium sulphate, ammonium nitrate and ammonium phosphate.
 - c. It is used in the manufacture of sodium carbonate by the Solvay process.
$$\text{NaCl} + \text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NH}_4\text{Cl}$$

(c)

- i. When carbon and conc. nitric acid are heated, the products formed are carbon dioxide, nitrogen dioxide and water.

$$\text{C} + 4\text{HNO}_3 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + 4\text{NO}_2$$
- ii. Copper when reacts with dilute HNO_3 forms copper nitrate, nitric oxide and water.

$$3\text{Cu} + 8\text{HNO}_3 \rightarrow 3\text{Cu}(\text{NO}_3)_2 + 4\text{H}_2\text{O} + 2\text{NO}$$

Answer 6

(a)

- i. Occurrence of metals: Metals placed at the top of the activity series are most reactive, so they always exist in the combined state, whereas metals placed below the activity series are least reactive, so they can be found in the isolated state also.
- ii. Tendency to corrode: Metals lying above hydrogen in the activity series can easily react with moisture and air and corrode easily, whereas metals such as gold and platinum do not corrode easily.
- iii. Reaction with water: The ability of metals to reduce water to hydrogen decreases on moving down the series. Potassium and sodium react with cold water, whereas magnesium reacts with warm water and aluminium, zinc and iron react with steam.
- iv. Reaction with acids: All the metals above hydrogen in the activity series reduce hydrogen ions from dil. hydrochloric or sulphuric acid and give out hydrogen gas. The rate of reaction decreases on moving down the series.

(b)

- i. A metal which occurs as sulphide is lead.
- ii. A metal which occurs as halide is silver.
- iii. A metal which occurs as carbonate is zinc.
- iv. A metal which occurs as oxide is iron.

(c)

- i. Bring a glass rod dipped in ammonia solution near the mouth of each test tube containing dil. HCl and dil. H₂SO₄.

Dil. HCl	Dil. H ₂ SO ₄
White fumes of ammonium chloride	No such fumes

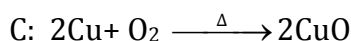
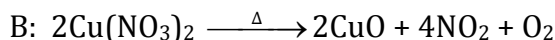
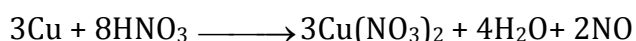
ii.

- a. Dilute sulphuric acid treated with zinc gives hydrogen gas which burns with a pop sound.
Concentrated H₂SO₄ gives SO₂ gas with zinc and the gas turns acidified potassium dichromate paper green.
- b. Barium chloride solution gives white ppt. with dilute H₂SO₄. This white ppt. is insoluble in all acids.
Concentrated H₂SO₄ and NaCl mixture when heated gives dense white fumes if a glass rod dipped in ammonia solution is brought near it.

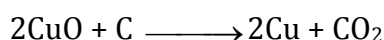
Answer 7

(a)

A: Copper can be converted to copper nitrate.



D: By reduction



(b)

- i. NaHSO₄
- ii. AgCl
- iii. CuSO₄.5H₂O
- iv. CuCO₃

(c)

- i. Hydrogen reacts with chlorine to form hydrogen chloride.
- ii. Dilute hydrochloric acid cannot be concentrated by boiling beyond 22.2% because molecules of HCl_(g) get mixed with water vapour.