

ICSE Board
Class X Chemistry
Sample Paper – 15 Solution

SECTION I

Answer 1

a.

- i. Nitrogen dioxide
- ii. Alcohol
- iii. Hydroxyl (OH^-) ion other than ammonium ion
- iv. Oxygen is the product formed at the anode.
- v. Ferric oxide and chromic oxide

b.

- i. Element with highest first ionisation energy: Neon (Ne)
- ii. Element with highest electronegativity: Fluorine (F)
- iii. Element with largest atomic size: Lithium (Li)
- iv. Most reactive non-metal: Fluorine
- v. Most reactive metal: Lithium

c.

- i. The electrovalent bond or ionic bond is called **heteropolar bond**.
- ii. When ionic compounds are dissolved in water, their constituent ions get separated; this phenomenon is called **ionisation** or **dissociation**.
- iii. **Ionic** compounds are generally soluble in water and insoluble in organic solvents.
- iv. Coordinate bond is also called **dative** bond.
- v. A coordinate bond is represented by an arrow pointing from **donor** to **acceptor** atom.

d.

- i. Hydrogen chloride is a **polar** covalent compound.
- ii. Ammonia turns **moist** red litmus blue.
- iii. **Concentrated** sulphuric acid is the least volatile acid.
- iv. **Burning** magnesium reacts with nitrogen to form magnesium nitride.
- v. Hydrogen chloride is **highly** soluble in water.

e.

- i. (d) High lattice energy
- ii. (b) Low boiling and melting points
- iii. (a) Equal electronegativities of combining atoms
- iv. (d) NH_4^+
- v. (b) Methane

f.

- i. $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$
- ii. $\text{Zn} + \text{H}_2\text{SO}_4(\text{dil.}) \rightarrow \text{ZnSO}_4 + \text{H}_2$
- iii. $\text{Mg}_3\text{N}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{Heat}} 3\text{Mg}(\text{OH})_2 + 2\text{NH}_3$
- iv. $\text{C}_{12}\text{H}_{22}\text{O}_{11} \xrightarrow{\text{Conc. H}_2\text{SO}_4} 12\text{C} + 11\text{H}_2\text{O}$
- v. $\text{Cu} + 4\text{HNO}_3(\text{conc.}) \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{NO}_2 + 2\text{H}_2\text{O}$

g.

- i. CaO
- ii. CuO
- iii. $\text{Cu}[(\text{OH})_2]$
- iv. Ferric hydroxide $[\text{Fe}(\text{OH})_3]$.
- v. NH_3

h.

Column I	Column II
(i) $\text{P}(\text{NO}_3)_2$ from PbO	(A) Precipitation
(ii) MgCl_2 from Mg	(F) Simple displacement
(iii) FeCl_3 from Fe	(B) Combination
(iv) NaNO_3 from NaOH	(G) Neutralisation
(v) ZnCO_3 from ZnSO_4	(H) Titration

SECTION II

Answer 2

a.

- i. Zinc reacts with copper sulphate to give zinc sulphate and copper metal.
 $\text{CuSO}_{4(\text{aq})} + \text{Zn}_{(\text{s})} \rightarrow \text{ZnSO}_{4(\text{aq})} + \text{Cu}_{(\text{s})}$
- ii. Magnesium reacts with HCl to give magnesium chloride and hydrogen gas.
 $\text{Mg}_{(\text{s})} + 2\text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2} + \text{H}_{2(\text{g})}$
- iii. Sodium reacts with water to give sodium hydroxide and hydrogen gas.
 $2\text{Na}_{(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})} \rightarrow 2\text{NaOH}_{(\text{aq})} + \text{H}_{2(\text{g})}$

b.

Metal	Ore
Mercury	Cinnabar
Aluminium	Bauxite
Sodium	Rock Salt
Calcium	Lime Stone

c.

- i. $\text{Fe}_2\text{O}_3 + 2\text{Al} \longrightarrow 2\text{Fe} + \text{Al}_2\text{O}_3$
- ii. $2\text{Al}(\text{OH})_3 \longrightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2\text{O}$
- iii. $2\text{Al} + \text{N}_2 \longrightarrow 2\text{AlN}$

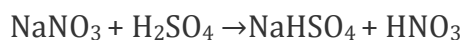
Answer 3

a.

- i. a) Single bond: Methane, CH_4 . It is quite unreactive; hence, it undergoes a substitution reaction with chlorine in the presence of sunlight.
b) Double bond: Ethene, $\text{CH}_2=\text{CH}_2$. It undergoes an addition reaction in the presence of a catalyst like nickel or palladium.
- ii. A detergent is the sodium salt of long chain benzene sulphonic acid which has cleansing properties in water. Example: Sodium n-dodecyl benzene sulphonate
- iii. Detergents are better cleansing agents than soaps because they do not form insoluble calcium and magnesium salts with hard water, and hence, they can be used for washing even with hard water.

b.

- i. Sodium nitrate on treatment with dilute sulphuric acid gives sodium bisulphate and nitric acid.



Sodium sulphite on treatment with dilute sulphuric acid gives sodium sulphate and sulphur dioxide.



- ii. When moist starch iodide paper is introduced into chlorine gas, chlorine oxidises iodide to iodine, which shows up as blue complex with starch.
- iii. On carrying out the flame test with Salt P, a brick red flame is obtained. Hence, the cation P is Ca^{2+} .
- iv. Gas Q turns moist lead acetate paper silvery black. Hence, the gas is H_2S .
- v. The pH of liquid R is 10. Hence, substance R is a base.

- c. Alkenes are the (a) homologous series of (b) unsaturated hydrocarbons. They differ from alkanes due to the presence of (c) single bonds. Alkenes mainly undergo (d) addition reactions.

Answer 4

a.

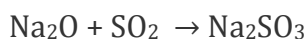
	Anode	Electrolyte	Cathode
Silver plating of spoon	<u>Plate of pure clean silver</u>	Solution of potassium argentocyanide	<u>Article to be electroplated</u>
Purification of copper	<u>Impure copper</u>	<u>Solution of copper sulphate and dilute sulphuric acid</u>	<u>Thin strip of pure copper</u>

b.

- The catalyst which helps in the conversion of sulphur dioxide to sulphur trioxide in Step C is vanadium pentoxide.
- Two steps for the conversion of sulphur trioxide to sulphuric acid are
 - $\text{SO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{S}_2\text{O}_7$
 - $\text{H}_2\text{S}_2\text{O}_7 + \text{H}_2\text{O} \rightarrow 2\text{H}_2\text{SO}_4$
- The substance which will liberate sulphur dioxide in Step E is dilute H_2SO_4 .
- The equation for the reaction by which sulphur dioxide is converted to sodium sulphite in Step F is

$$\text{SO}_2 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_3 + \text{H}_2\text{O}$$

Or



Answer 5

a.

i.

Element	Relative atomic mass	% Compound	Atomic ratio	Simplest ratio
H	1	2.13	$2.13/1 = 2.13$	2
C	12	12.67	$12.67/12 = 1.055$	2
Br	80	85.11	$85.11/80 = 1$	1

Empirical formula = CH_2Br

$n(\text{Empirical formula mass of } \text{CH}_2\text{Br}) = \text{Molecular mass } (2 \times \text{VD})$

$$n(12 + 2 + 80) = 94 \times 2$$

$$n = 2$$

$$\begin{aligned}\text{Molecular formula} &= \text{Empirical formula} \times 2 \\ &= (\text{CH}_2\text{Br}) \times 2 \\ &= \text{C}_2\text{H}_4\text{Br}_2\end{aligned}$$

ii.

a) 10^{22} atoms of sulphur:

6.022×10^{23} atoms of sulphur will have mass = 32 g

$$10^{22} \text{ atoms of sulphur will have mass} = \frac{32 \times 10^{22}}{6.022 \times 10^{23}}$$

$$= 0.533 \text{ g}$$

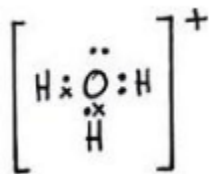
b) 0.1 mole of carbon dioxide

1 mole of carbon dioxide will have mass = 44 g

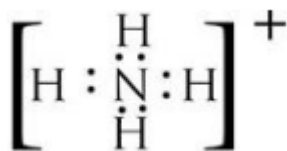
0.1 mole of carbon dioxide will have mass = 4.4 g

b.

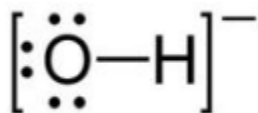
i.



a)



b)



c)

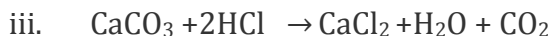
ii.

a) Ammonium ion and hydronium ion

b) Phosphorus pentachloride and diamond

Answer 6

a.



b.

- i. Hydrochloric acid is prepared by this method.
- ii. The reactants are sodium chloride and sulphuric acid.
- iii. The empty flask acts as an anti-suction device. In case the back suction occurs, water will collect in it and will not reach the generating flask.
- iv. The drying agent is conc. sulphuric acid. Sulphuric acid is chosen as a drying agent because it does not react with HCl.
- v. The inverted funnel
 - a) Prevents or minimises back suction of water
 - b) Provides a large surface area for the absorption of HCl gas

Answer 7

a.

- i. Ethene
- ii. Methane
- iii. Ethene
- iv. Methane
- v. Ethyne, ethene

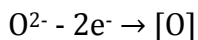
b.

- i. Fluorspar is CaF_2 , and it helps in the mobility of the fused mixture.
- ii. The cathode is the inner lining of gas-carbon of the electrolytic cell, and the anode is the thick carbon rods dipping into the fused electrolyte.

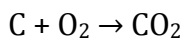
- iii. At the cathode: Aluminium ions get reduced as

$$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$$

At the anode: Oxygen gas is liberated as



Oxygen formed at the anode oxidises the carbon of the anode to carbon dioxide.



As a result, the anode gets oxidised and it has to be replaced periodically.

c.

- i. Ba metal will form ions readily because ionisation energy decreases down the group as the size increases.
- ii. On moving down the group, the number of electrons in the outermost shell, i.e. valence electrons remain the same. So, the valency in a group remains the same, i.e. 2.