ICSE SOLVED PAPER- 2020
Class X
CHEMISTRY
SCIENCE PAPER-2

(Two hours)

Answer to this Paper must be written on the paper provided separately.

*You will **not** be allowed to write during the first **15 minutes***

*This time is to be spent in reading the **Question Paper**.*

*The time given at the **head of this Paper is the time allowed for writing the answers.***

***Section I** is compulsory. Attempt **any four** questions from **Section II**.*

The intended marks for questions or parts of questions are given in brackets [].

SECTION I (40 Marks)

*Attempt **all** questions from this Section*

Question 1.

(a) Choose the correct answer from the options given below : **[5]**

(i) The element with *highest* ionization potential is :

A. Hydrogen B. Caesium
C. Radon D. Helium

(ii) The *inert* electrode used in the electrolysis of acidified water, is :

A. Nickel B. Platinum
C. Copper D. Silver

(iii) A compound with *low* boiling point, is :

A. Sodium chloride B. Calcium chloride
C. Potassium chloride D. Carbon tetrachloride

(iv) The *acid* which can produce carbon from cane sugar, is :

A. Concentrated Hydrochlodic acid B. Concentrated Nitric acid
C. Concentrated Sulphuric acid D. Concentrated Acetic acid

(v) The organic compound having a *triple* carbon-carbon covalent bond, is

A. C_3H_4 B. C_3H_6
C. C_3H_8 D. C_4H_{10}

(b) State *one relevant observation* for each of the following reactions : **[5]**

(i) Action of concentrated nitric acid on copper.

(ii) Addition of excess ammonium hydroxide into copper sulphate solution.

(iii) A piece of sodium metal is put into ethanol at room temperature.

(iv) Zinc carbonate is heated strongly.

(v) Sulphide ore is added to a tank containing oil and water and then strirred or agitated with air.

(c) Write a balanced chemical equation for each of the following : **[5]**

(i) Reaction of carbon powder and concentrated nitric acid.

(ii) Reaction of excess ammonia with chloride.

(iii) Reaction of lead nitrate solution with ammonium hydroxide.

(iv) Producing ethane from bromo ethane using Zn\Cu couple in alcohol.

(v) Complete combustion of ethatne.

(d) **(i)** Draw the structural formula for each of the following : **[5]**

1. 2, 2 dimethyl pentane
2. methanol
3. Iso propane

(ii) Write the IUPAC name for the following componds :

1. acetaldehyde
2. acetylene

(e) State one relevant reason for each of the following : **[5]**

(i) Graphite anode is preferred to platinum in the electrolysis of molten lead bromide.

(ii) Soda lime is preferred to sodium hydroxide in the laboratory preparation of methane.

(iii) Hydrated copper sulphate crystals turn white on heating.

(iv) Concentrated nitric acid appears yellow, when it is left for a while in a glass bottle.

(v) Hydrogen chloride gas fumes in moist air.

(f) Calculate : **[5]**

(i) The amount of each reactant required to produce 750 ml of carbon dioxide, when two volumes of carbon monoxide combine with one volume of oxygen to produce two volumes of carbon dioxide.

$$2CO + O_2 \rightarrow 2CO_2$$

(ii) The volume occupied by 80 g of carbon dioxide at STP.

(iii) Calculate the number of molecules in 4.4 gm of CO_2. [Atomic mass of C = 12, O = 16]

(iv) State the law associated in question no. (f) (i) above.

(g) Give *one word or a phrase* for the following statements : **[5]**

(i) The chemical bond formed by a shared pair of electrons, each bonding atom contributing one electron to the pair.

(ii) Electrode used as cathode in electrorefining of impure copper.

(iii) The substance prepared by adding other metals to a base metal in appropriate proportions to obtain certain desirable properties.

(iv) The tendency of an atom to attract electrons to itself when combined in a compound.

(v) The reaction in which carboxylic acid reacts with alcohol in the presence of conc. H_2SO_4 to form a substance having a fruity smell.

(h) Fill in the blanks from the choices given in brackets : **[5]**

(i) The polar covalent compound in gaseous state that does not conduct electricity is .....
(*carbon tetra chloride, ammonia, methane*)

(ii) A salt prepared by displacement reaction is .....
(*ferric chloride, ferrous chloride, silver chloride*)

(iii) The number of moles in 11gm of nitrogen gas is .....
(*0.39, 0.49, 0.29*) [*atomic mass of N = 14*]

(iv) An alkali which completely dissociates into ions is .....
(*ammonium hydroxide, calcium hydroxide, lithium hydroxide*)

(v) An alloy used to make statues is .....
(*bronze, brass, fuse metal*)

SECTION II (40 Marks)

*Attempt **any four** questions from this Section*

Question 2.

(a) The following table represents the elements and the atomic number. **[3]**

With reference to this, answers the following using only the alphabets given in the table.

Element	Atomic number
P	13
Q	7
R	10

(i) Which element combines with hydrogen to form a basic gas ?

(ii) Which element has an electon affinity zero ?

(iii) Name the element, which forms an ionic compound with chlorine.

(b) Draw the electron dot diagram for the compounds given below. Represent the electron by (·) and (×) in the diagram. [Atomic No.: Ca = 20, O = 8, Cl = 17, H = 1] **[3]**

(i) Calcium oxide
(ii) Chlorine molecule
(iii) Water molecule

(c) Choose the correct word which refers to the process of electrolysis from A to E, to match the description (i) to (iv) :
A. Oxidation; B. Cathode; C. Anode; D. An electrolyte; E. Reduction **[4]**

(i) Conducts electricity in aqueous or in molten state.
(ii) Loss of electron takes place at anode.
(iii) A reducing electrode.
(iv) Electrode connected to the positive end or terminal of the battery.

Question 3.

(a) Bayer's process is used to concentrate bauxite to alumina. **[3]**
Give balanced chemical equations for the reaction taking place for its conversion from bauxite to alumina.

(b) Complete the following by selecting the *correct option* from the choices given : **[3]**

(i) pH of acetic acid is greater than dilute sulphuric acid. So acetic acid contains ..... concentration of H^+ ions. (*greater, same, low*)
(ii) The indicator which does not change colour on passage of HCl gas is ..... (*methyl orange, moist blue limits, phenolphthalein*)
(iii) The acid which cannot act as an oxidizing agent is ..... (*conc. H_2SO_4, conc. HNO_3, conc. HCl*)

(c) Match the gases given in column I to the identification of the gases mentioned in column II. **[4]**

Column I		Column II	
(i)	Hydrogen sulphide	A.	Turns acidified potassium dichromate solution green.
(ii)	Nitric oxide	B.	Turns lime water milky.
(iii)	Carbon dioxide	C.	Turns reddish brown when it reacts with oxygen.
(iv)	Sulphur dioxide	D.	Turns moist lead acetate paper silvery black.

Question 4.

(a) Differentiate between the following pairs based on the information given in the brackets. **[3]**
(i) Conductor and electrolyte (conducting particles)
(ii) Cations and anions (formation from an atom)
(iii) Acid and Alkali (formation of type of ions)

(b) Draw the structure of isomers of pentane. **[3]**

(c) Hydrogen chloride gas is prepared in the laboratory using concentrated sulphuric acid and sodium chloride. Answer the questions that follow based on this reaction. **[4]**
(i) Give the balanced chemical equation for the reaction with suitable condition(s), if any.
(ii) Why is concentrated suphuric acid used instead of concentrated nitric acid.
(iii) How is the gas collected ?
(iv) Name the drying agent not used for drying the gas.

Question 5.

(a) Distinguish between the following pairs of compounds using a reagent as a chemical test : **[3]**
(i) Calcium nitrate and Zinc nitrate solution.
(ii) Ammonium sulphate crystals and Sodium sulphuric crystals.
(iii) Magnesium chloride and Magnesium nitrate solution.

(b) Calculate the percentage of : **[3]**
(i) Fluorine
(ii) Sodium and
(iii) Aluminium
in sodium aluminium fluoride [Na_3AlF_6], to the nearest whole number.
[Atomic mass : Na = 23, Al = 27, F = 19]

(c) **(i)** State the volume occupied by 40 gm of methane at STP, if its vapour density (V.D.) is 8. **[4]**

(ii) Calculate the number of moles present in 160 gm of NaOH.
[Atomic mass : Na = 23, H = 1, O = 16].

Question 6.

(a) Identify the salts **P, Q, R** from the following observations : **[3]**

(i) Salt **P** has light bluish green colour. On heating , it produces a black coloured residue. Salt **P** produces brisk effervescence with dil. HCl and the gas evolved turns lime water milky, but no action with acidified potassium dichromatic solution.

(ii) Salt **Q** is white in colour. On strong heating, it produces buff yellow residue and liberates reddish brown gas. Solution of salt **Q** produces chalky white insoluble precipitate with excess of ammonium hydroxide.

(iii) Salt **R** is black in colour. On reacting with concentrated HCl, it liberates a pungent greenish yellow gas which turns moist starch iodide paper blue black.

(b) Identify the substance underlined in each of the following : **[3]**

(i) The <u>electrode</u> that increases in mass during the electro-refining of silver.

(ii) The <u>acid</u> that is a dehydrating as well as a drying agent.

(iii) The <u>catalyst</u> used to oxidize ammonia into nitric oxide.

(c) Copy and complete the following paragraph using the options given in brackets : **[4]**

Alkenes are a homologous series of (i) ..... (saturated / unsaturated) hydrocarbons characterized by the general formula (ii) ..... (C_nH_{2n+2} / C_nH_{2n}), Alkenes undergo (iii) ..... (addition / substitution) reactions and also undergo (iv) ..... (hydrogenation / dehydrogenation) to form alkanes.

Question 7.

(a) Write balanced chemical equations, for the preparation of the given salts (i) to (iii) by using the methods A to C respectively :

A. Neutralization *B. Precipitation* *C. Titration* **[3]**

(i) Copper sulphate

(ii) Zinc carbonate

(iii) Ammonium sulphate

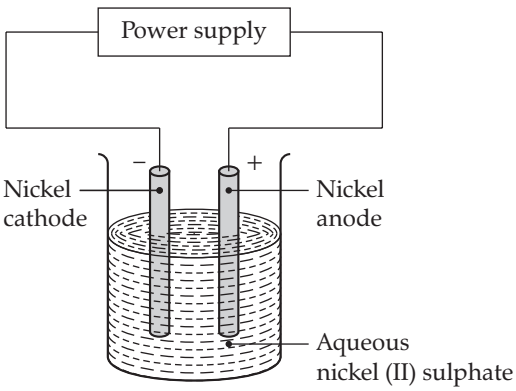
(b) Name the following elements : **[3]**

(i) An alkaline earth metal present in group 2 and period 3.

(ii) A trivalent metal used to make light tools.

(iii) A monovalent non-metal present in fluorspar.

(c) An aqueous solution of nickel (II) sulphate was electrolyzed using nickel electrodes. Observe the diagram and answer the question that follow : **[4]**



(i) What do you observe at the **cathode** and **anode** respectively ?

(ii) Name the cation that remains as a spectator ion in the solution.

(iii) Which equation for the reaction at the anode is correct ?

1. $Ni \rightarrow Ni^{2+} + 2e^-$
2. $Ni + 2e^- \rightarrow Ni^{2+}$
3. $Ni^{2+} \rightarrow Ni + 2e^-$
4. $Ni^{2+} + 2e^- \rightarrow Ni$

ANSWERS

SECTION I

1. (a) **(i)** A - Hydrogen

(ii) D - Silver

(iii) D - Potassium chloride

(iv) C - Concentrated Sulphuric acid

(v) A - C_3H_4

(b) **(i)** When concentrated nitric acid reacts with copper, a reddish brown gas having pungent smell is evolved.

$$3Cu + 4HNO_3(conc.) \xrightarrow{\Delta} Cu(NO_3)_2 + 2H_2O + 2NO_2$$

(ii) When excess ammonium hydroxide is added into copper sulphate solution, a deep blue solution of tetraamine copper (II) sulphate is formed.

$$CuSO_4 + 2NH_4OH \longrightarrow Cu(OH)_2 + (NH_4)_2SO_4 + 4H_2O$$

$$Cu(OH)_2 + (NH_4)_2SO_4 + 2NH_4OH \longrightarrow \underset{\text{Tetraamine copper (II) sulphate}}{[Cu(NH_3)_4]SO_4} + 4H_2O$$

(iii) When a piece of sodium metal is put into ethanol at room temperature, it gives off hydrogen gas with bubbles and a colourless solution of sodium ethoxide is formed :

$$2C_2H_5OH + 2Na \longrightarrow \underset{\text{Sodium ethoxide}}{2C_2H_5ONa} + H_2\uparrow$$

(iv) Zinc carbonate on heating strongly decomposes to zinc oxide and carbon dioxide gas.

$$ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2\uparrow$$

(v) When sulphide ore is added to a tank containing oil and water and then stirred or agitated with air, the froth is formed, the ore particles are wetted by oil and the gangue particles are wetted by water.

(c) **(i)** $C + 4HNO_3(conc.) \longrightarrow CO_2 + \underset{\text{Nitrogen oxide}}{4NO_2} + 2H_2O$

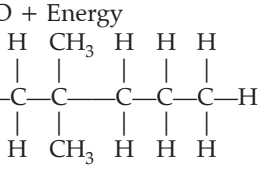
(ii) $8NH_3(g) + 3Cl_2(g) \longrightarrow \underset{\text{Nitrogen}}{N_2(g)} + \underset{\text{Ammonium Chloride}}{6NH_4Cl(g)}$

(iii) $Pb(NO_3)_2 + 2NH_4OH \longrightarrow \underset{\text{Lead (II) hydroxide}}{Pb(OH)_2} + \underset{\text{Ammonium nitrate}}{2NH_4NO_3}$

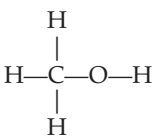
(iv) $C_2H_5Br + 2[H] \xrightarrow[\text{alcohol}]{Zn/Cu \text{ in}} C_2H_6 + HBr$

(v) $2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O + \text{Energy}$

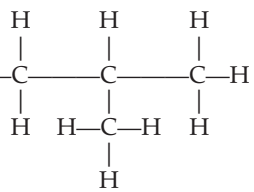
(d) **(i)** (1) 2, 2 dimethyl pentane :



(2) Methanol :



(3) Iso-propane :



(ii) (1) Acetaldehyde—Ethanal

(2) Acetylene—Ethyne

(e) **(i)** Graphite anode is preferred to platinum in the electrolysis of molten lead bromide because graphite is unaffected by the bromine vapour.

(ii) Soda lime is preferred to sodium hydroxide in the laboratory preparation of methane because sodium hydroxide absorbs water from the atmosphere white soda lime (NaOH + CaO) is stable and absorbs less amount of water.

(iii) When hydrated copper sulphate is heated it turns white because it loses its crystalline water and becomes anhydrous.

(iv) When concentrated nitric acid is left for a while in a glass bottle it decomposes to give out nitrogen dioxide, which dissolves in this and appears yellow in colour.

(v) Hydrogen chloride gas fumes in moist air because it is highly soluble and forms a mist of droplets of HCl that appears as white fumes.

(f) **(i)** $\underset{\text{2 Volume}}{2CO} + \underset{\text{1 Volume}}{O_2} \longrightarrow \underset{\substack{\text{2 Volume}\\(750\text{ ml})}}{2CO_2}$

At STP volume = 22400 ml

$\because$ 2×22400 ml CO is used to form 2×22400 ml CO_2

$\therefore$ 750 ml CO_2 is formed from $\frac{2 \times 22400 \times 750}{2 \times 22400}$ = 750 ml CO used to form 750 ml of CO_2.

$\because$ 2×22400 CO_2 is formed from 1×22400 ml O_2

$\therefore$ 750 ml $CO_2$is formed from $\frac{1 \times 22400 \times 750}{2 \times 22400}$ = 375 ml O_2 is used to form 750 ml of CO_2.

(ii) Molar mass of $CO_2 = 12 + 16 \times 2 = 44$

If 44 gm of CO_2 contain 22400 *l* at STP

$\therefore$ 80 gm of CO_2 contains $= \frac{22400 \times 80}{44} = 40.72\ l.$

(iii) $$\text{No. of molecules} = \frac{\text{Mass of the substance}}{\text{Molar mass of the substance}} \times N_0$$

Mass of the substance = 4.4 gm

$N_0 = 6.022 \times 10^{23}$

Molar mass of the substance (CO_2) = $12 + 16 \times 2 = 44$ gm

$$\text{No. of molecules} = \frac{4.4}{44} \times 6.022 \times 10^{23}$$

$$= 0.1 \times 6.022 \times 10^{23}$$

$$= 6.022 \times 10^{22}$$

(iv) Gay Lussac's law.

(g) **(i)** Covalent bond

(ii) Pure copper metal

(iii) Alloy

(iv) Electronegativity

(v) Esterification

(h) **(i)** ammonia

(ii) ferrous chloride

(iii) No. of moles in 11 gm of $N_2 = \frac{\text{Mass of the substance}}{\text{Molar mass}}$

$$= \frac{11\text{ gm}}{28\text{gm}}$$

$$= 0.39$$

(iv) $Ca(OH)_2$, calcium hydroxide

(v) Bronze

SECTION II

2. (a)

Element	Atomic number	Electronic configuration
P	13	2, 8, 3
Q	7	2, 5
R	10	2, 8

(i) Q (The base formed is NH_3 because it dissolves in water and forms basic solution of ammonium hydroxide.)

(ii) R (because it has complete octet)

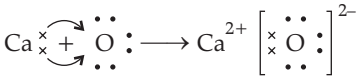
(iii) P (It has 3 valence electrons which are completely transferred to chlorine and form trichloride)

(b) Electronic configuration of elements :

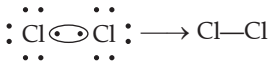
$_{20}Ca$ = 2, 8, 8, 2 $\qquad$ $_{8}O$ = 2, 6

$_{17}Cl$ = 2, 8, 7 $\qquad$ $_{1}H$ = 1

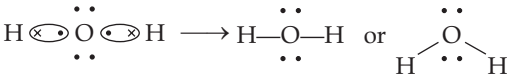
(i) Calcium oxide (CaO)



(ii) Chlorine molecule (Cl_2)



(iii) Water molecule (H_2O)



(c) **(i)** An electrolyte

(ii) Oxidation

(iii) Cathode

(iv) Anode

3. (a) Bayer's method for extraction of alumina from bauxite ore.

$$\underset{\text{Bauxite}}{Al_2O_3.2H_2O} \xrightarrow{NaOH} \underset{\text{Sodium aluminate}}{2NaAlO_2} + 3H_2O$$

$$NaAlO_2 + 2H_2O \longrightarrow NaOH + \underset{\text{Aluminium hydroxide}}{Al(OH)_3}$$

$$2Al(OH)_3 \xrightarrow{1473\ K} \underset{\substack{\text{Alumina}\\(\text{pure})}}{Al_2O_3} + 3H_2O$$

(b) **(i)** low

(ii) phenolphthalein

(iii) Conc. HCl

(c)

	Column I	Column II
(i)	Hydrogen sulphide	Turns moist lead acetate paper to silvery black.
(ii)	Nitric oxide	Turns reddish brown when it reacts with oxygen.
(iii)	Carbon dioxide	Turns lime water milky.
(iv)	Sulphur dioxide	Turns acidified potassium dichromate solution green.

4. (a) (i)

Conductor	Electrolyte
Conducting particles are free electrons.	Conducting particles are ions.

(ii)

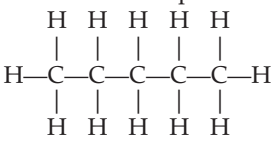
Cations	Anions
These are positively charged species which are formed by loss of electrons. e.g. Na^+, Ca^{2+}, etc.	These are negatively charged species which are formed by gain of electrons. e.g. Cl^-, SO_4^{2-}, etc.

(iii)

Acid	Alkali
The compound which when dissolved in water gives hydronium ion (H^+ or H_3O^+).	The compound which when dissolved in water gives hydroxide ion (OH^-).

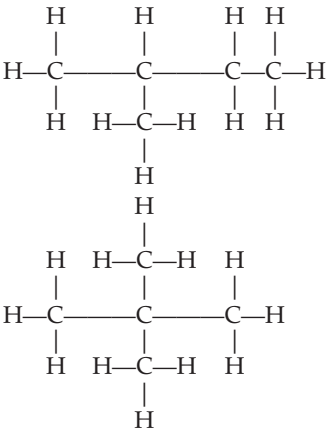
(b) Molecular formula of pentane C_5H_{12} isomers of pentane are :

(i)



n-pentane
(Pentane)

(ii)



Iso-pentane
(2-methyl butane)

(iii)

Neopentane
(2, 2-dimethyl propane)

(c) (i)

$$\underset{\text{Rock salt}}{2NaCl} + \underset{\text{conc.}}{H_2SO_4} \xrightarrow[200°C]{\text{above}} \underset{\text{Sodium sulphate}}{Na_2SO_4} + \underset{\substack{\text{Hydrogen}\\\text{chloride gas}}}{2HCl}$$

Or

$$NaCl + H_2SO_4 \xrightarrow[200°C]{\text{below}} NaHSO_4 + HCl$$

(ii) Conc. sulphuric acid acts as dehydrating agent while nitric acid is a strong oxidising agent.

(iii) The gas is collected by upward displacement of air as it is heavier than air.

(iv) Phosphorous pentaoxide (P_2O_5) and calcium oxide (CaO).

5. (a) (i) By ammonium hydroxide

Calcium nitrate	Zinc nitrate
When ammonium hydroxide is added in excess no precipitate of calcium hydroxide occurs.	When ammonium hydroxide is added in excess white gelatinous precipitate of zinc hydroxide is formed which is soluble in excess NH_4OH.

(ii) By sodium hydroxide

Ammonium sulphate crystals	Sodium sulphate crystals
When sodium hydroxide is added white gelatinous precipitate of zinc hydroxide is formed.	Sodium sulphate does not react with sodium hydroxide.

(iii) By silver nitrate

Magnesium chloride	Magnesium nitrate
On adding silver nitrate solution white precipitate of silver chloride is formed.	On adding silver nitrate no reaction occurs.

(b) Molar mass of sodium aluminium fluoride [Na_3AlF_6].

$= 3 \times 23 + 27 + 6 \times 19$ [Atomic mass : Na = 23, Al = 27, F = 19]

$= 69 + 27 + 114$

$= 210$ gm.

(i) $$\text{Percentage of fluorine} = \frac{\text{Mass of the fluorine}}{\text{Molecular mass of } Na_3AlF_6} \times 100$$

$$= \frac{19 \times 6}{210} \times 100 = 54.3\%$$

It has to be rounded up to nearest whole number so 54%.

(ii) $$\text{Percentage of sodium} = \frac{\text{Mass of the sodium}}{\text{Molecular mass of } Na_3AlF_6} \times 100$$

$$= \frac{23 \times 3}{210} \times 100 = 32.8\%$$

It has to be rounded up to nearest whole number so 33%.

(iii) $$\text{Percentage of aluminium} = \frac{\text{Mass of the aluminium}}{\text{Molecular mass of } Na_3AlF_6} \times 100$$

$$= \frac{27}{210} \times 100 = 12.86\%$$

It has to be rounded up to nearest whole number so 13%.

(c) **(i)** Molecular mass of methane (CH_4) $= 12 + 1 \times 4$

$= 16$ gm

Mass of methane $= 40$

M $=$ V.D. $\times 2$

$= 8 \times 2$

$= 16$ gm

Volume of 16 gm of CH_4 at STP $= 22.4$ l

Volume of 40 gm of CH_4 at STP $= \frac{22.4 \times 40}{16}$

$= 56\ l$

(ii) Mass of the NaOH $= 160$ gm

Molecular mass of NaOH $= 23 + 16 + 1$

$= 40$

$$\text{Number of moles} = \frac{\text{Mass of the substance}}{\text{Molecular mass}}$$

$$= \frac{160}{40} = 4 \text{ moles}$$

6. (a) **(i)**

P (Light blue) —Δ→ Black residue

P (Light blue) —Dil. HCl→ Brisk effervescence ⟶ Lime water turns milky

P (Light blue) —Acidified $K_2Cr_2O_7$→ No action

Copper salts are blue in colour. It produces a gas with HCl, which turns lime water milky. It must be a cabonate. Hence, **P is copper carbonate**.

$$CuCO_3 \xrightarrow{\Delta} \underset{\text{Black}}{CuO} + CO_2$$

$$CuCO_3 + \underset{\text{dil.}}{HCl} \longrightarrow CuCl_2 + CO_2\uparrow + H_2O$$

$$CO_2 + \underset{\text{Lime water}}{Ca(OH)_2} \longrightarrow \underset{\text{milky solution}}{CaCO_3\downarrow} + H_2O$$

(ii)

$$\underset{\text{White solution}}{Q} \xrightarrow{\Delta} \underset{\text{Buff yellow}}{\text{ppt}} + \text{reddish brown gas}$$

$$Q \xrightarrow{\text{Excess } NH_4OH} \text{White ppt.}$$

Nitrate compounds always produce reddish brown gas. Buff yellow ppt. is of lead oxide. Hence, **Q is lead nitrate.**

$$\underset{\substack{\text{Lead nitrate}\\ \text{white}}}{2Pb(NO_3)_2(g)} \xrightarrow{\Delta} \underset{\substack{\text{Lead oxide}\\ \text{yellow}}}{2PbO} + \underset{\substack{\text{Nitrogen di}\\ \text{oxide}\\ \text{(Brown fumes)}}}{4NO_2(g)} + O_2(g)$$

$$Pb(NO_3)_2 + 2NH_4OH \longrightarrow \underset{\text{Chalky white}}{Pb(OH)_2\downarrow} + 2NH_4NO_3$$

(iii)

$$\underset{\text{Black}}{R} \xrightarrow{\text{conc. HCl}} \text{greenish yellow gas} \xrightarrow{\text{Moist starch iodide}} \text{Blue black}$$

The evolved gas is greenish yellow gas, this confirms that the gas is chlorine.

Black salt is manganese dioxide which reacts with HCl to produce chlorine gas.

$$MnO_2(s) + 4HCl(aq.) \longrightarrow \underset{\text{greenish yellow}}{Cl_2(g)} + MnCl_2(aq) + 2H_2O$$

$$Cl_2(g) + \underset{\text{(Moist)}}{\text{Starch iodide paper}} \longrightarrow \text{Blue black}$$

(b) **(i)** Cathode

(ii) Conc. H_2SO_4

(iii) Pt

(c) **(i)** unsaturated

(ii) C_nH_{2n}

(iii) addition

(iv) hydrogenation

7. (a) **(i)** Copper sulphate—by neutralization :

$$\underset{\substack{\text{Copper oxide}\\ \text{(Base)}}}{CuO} + \underset{\substack{\text{dil.}\\ \text{(Acid)}}}{H_2SO_4} \longrightarrow \underset{\text{Copper sulphate}}{CuSO_4} + H_2O$$

(ii) Zinc carbonate—by precipitation

$$\underset{\text{Sodium carbonate}}{Na_2CO_3} + \underset{\text{Zinc sulphate}}{ZnSO_4} \longrightarrow \underset{\text{Zinc carbonate}}{ZnCO_3} + \underset{\text{Sodium sulphate}}{Na_2SO_4}$$

(iii) Ammonium sulphate—by titration

$$\underset{\text{Strong acid}}{H_2SO_4} + \underset{\text{Weak base}}{2NH_4OH} \longrightarrow \underset{\text{Ammonium sulphate}}{(NH_4)_2SO_4} + 2H_2O$$

(b) **(i)** Mg (Magnesium) (Atomic number : 12; electronic configuration : 2, 8, 2)

(ii) Al (Aluminium) (Atomic number : 13; electronic configuration : 2, 8, 3)

(iii) F (Fluorine) (Atomic number : 9; electronic configuration : 2, 7)

(c) **(i)** At cathode-reduction and at anode oxidation take place.

(ii) H^+ ion as a spectator ion.

(iii) 1. $Ni \longrightarrow Ni^{2+} + 2e^-$.

■■