

CHEMISTRY
SCIENCE Paper-2
(Two hours)

Answers 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 A is compulsory. Attempt **any four** questions from **Section B**

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

SECTION A

(Attempt all questions from this Section.)

QUESTION 1.

Choose the correct answers to the questions from the given options.

[15]

(Do not copy the questions, write the correct answer only.)

(i) Identify one statement that holds true for electrolysis of molten lead bromide.

- (a) Silver grey metal deposits at the anode.
- (b) Temperature is not maintained during electrolysis.
- (c) Brown vapours of bromine are obtained at the anode.
- (d) Electrolyte contains H^+ ions along with Pb^{2+} ions.

(ii) The number of C-H bonds in ethane molecule are:

- a. 6
- b. 4
- c. 8
- d. 10

(iii) In a periodic table, the element of period 3 are arranged in the increasing order of ionisation potentials

- (a) B, N, Cl, Ar
- (b) Mg, Si, S, Ar
- (c) Ar, Si, S, Mg
- (d) Si, Ar, Cl, Mg

(iv) Which of the following statements is correct about an aqueous solution of an acid and of a base?

- P. Higher the pH, stronger the acid
 - Q. Higher the pH, weaker the acid
 - R. Lower the pH, stronger the base
 - S. Lower the pH, weaker the base
- (a) P and R
 - (b) Q and R
 - (c) Q and S
 - (d) P and S

(v) Among the elements of period 2, the element which has high electron affinity is

- (a) fluorine
- (b) carbon
- (c) chlorine
- (d) lithium

(vi) Which of the following is a weak electrolyte?

- (a) Sodium chloride
- (b) Benzene
- (c) Sodium acetate
- (d) Ammonium acetate

(vii) The elements present in brass are:

- (a) Cu and Zn
- (b) Cu, Cr and Zn
- (c) Cu, Sn and Zn
- (d) Cu and Ni

(viii) The aim of the fountain experiment is to prove that:

- (a) HCl is denser than air
- (b) HCl is highly soluble in water
- (c) HCl is basic in nature
- (d) HCl fumes in air



(ix) **Assertion:** Reactive metals are not extracted from their aqueous salt solution by electrolysis.

Reason: On the passage of electric current, the ions produced H^+ ion and the metal ion, the metal ions get discharged in preference to H^+ ions

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false
- (d) Assertion is false but Reason is true

(x) The catalyst used in the conversion of ethyne to ethane.

- (a) $Al_2O_3/K_2Cr_2O_7$
- (b) Ni/Pt/Pd
- (c) V_2O_5
- (d) Fe/ H_2SO_4

(xi) Nitric acid turns orange coloured methyl orange.

- (a) Red
- (b) Orange
- (c) Pink
- (d) Blue

(xii) Heating sodium acetate with soda lime produces:

- (a) Ethane
- (b) Methane
- (c) Ethene
- (d) Ethyne

(xiii) The colour of the precipitate formed after the addition of a small amount of sodium hydroxide solution to an aqueous solution of ferric chloride is

- (a) gelatinous white
- (b) pale blue
- (c) reddish brown
- (d) dirty green

(xiv) The process of concentration of bauxite is known as:

- (a) Hall Heroult's process
- (b) Haber's process
- (c) Baeyer's process
- (d) Contact process

(xv) **Assertion:** Dilute HCl is stronger acid than highly concentrated acetic acid.

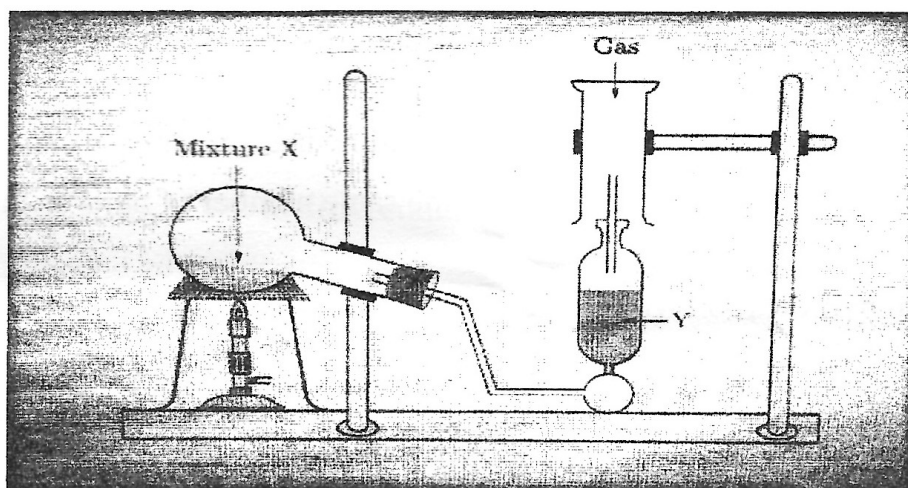
Reason: Strength of an acid is the measure of concentration of hydronium ions it produces in its aqueous solution.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false
- (d) Assertion is false but Reason is true

QUESTION 2.

(i) The diagram shows an experimental set up for the laboratory preparation of a pungent smelling gas. The gas is alkaline in nature.

[5]



- Name the gas collected in the jar.
- Write the balanced equation for the above preparation.
- How is the gas being collected?
- Name the drying agent used.
- How will you find that the jar is full of gas?

(ii) State any one relevant observation for each of the following:

[5]

- Action of concentrated nitric acid with sulphur.
- Ammonia burnt in an atmosphere of oxygen in absence of catalyst.
- Calcium nitrate is added in excess of sodium hydroxide.
- Sodium hydroxide is added to zinc sulphate solution.
- Concentrated sulphuric acid is added to cane sugar.

(iii) Complete the following by choosing the correct answers from the bracket:

[5]

- Across a period, the atomic size _____. [increases/decreases/remains same].
- A salt prepared by displacement reaction is _____. [ferric chloride/ferrous chloride/ silver chloride]
- Quicklime is not used to dry HCl gas because _____. [CaO is alkaline/CaO is acidic/ CaO is neutral]
- The black colour disappears forming a _____ solution when adding sulphuric acid to copper oxide. [blue/red/green]
- When a metallic oxide is dissolved in water, the solution formed has a high concentration of _____ ions. [H_3O^+ /OH⁻/H]

(iv) Identify the following: [5]

- (a) The amount of energy released when an atom in the gaseous state accepts an electron to form an anion.
- (b) A group of organic compounds having a similar structure and similar chemical properties.
- (c) The anhydrous acid on cooling forms a crystalline mass resembling ice.
- (d) The amount of substance which contains the same number of units as the number of atoms in 12g of C-12 .
- (e) Unsaturated hydrocarbon with general formula C_nH_{2n-2}

(v) (1.) Draw the structural formula for each of the following: [5]

- a. but-2-yne
- b. 2,3-dibromobutanal
- c. 3-Chloropentanoic acid

(vi) Write the IUPAC name for the following compounds:

- a. iso-butane
- b. acetylene

SECTION - B

(Attempt any four questions)

QUESTION 3.

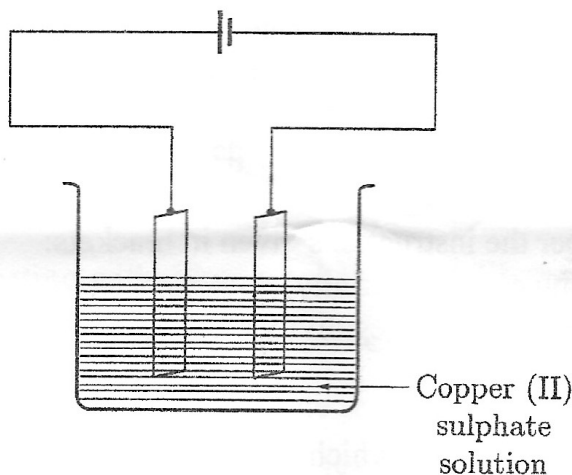
Question 3.

- i. Draw the positional isomers of pentene and write their IUPAC names. [3]
- ii. Define the term [2]
 - a. Isomerism
 - b. Gay Lussac's law of gaseous volumes
- iii. Explain the following: [3]
 - a. When it is left standing in a transparent glass bottle concentrated nitric acid appears yellow.
 - b. In the electroplating of an article with silver, the electrolyte sodium argentocyanide solution is used in preference over silver nitrate solution.
 - c. Concentrated H_2SO_4 is a strong oxidising and a dehydrating agent, but in the dilute form, is not.
- iv. Name the kind of particle present in: [2]
 - a. Carbonic acid
 - b. benzene



Question 4.

- i. Answer the following questions based on extraction of aluminium: [3]
- What is the name of the process and what is cathode made up of?
 - Write reaction taking place at cathode in the electrolytic cell.
 - Why cryolite is added to the electrolytic mixture during electrolytic reduction of alumina.
- ii. Give a suitable chemical test to differentiate between the following: [2]
- Lead nitrate and silver nitrate
 - Lead chloride and lead sulphide
- iii. The following questions are related to the manufacture of Nitric acid. [3]
- Name the process.
 - Why is the absorption tower filled with quartz stone?
 - Write a balanced equation taking place in the absorption tower.
- iv. Copper sulphate solution is electrolysed using copper electrodes. Study the diagram given below and answer the question that follows: [2]



- Which electrode to your left or right is known as the oxidising electrode and why?
- State two appropriate observations for the above electrolysis.

Question 5

- i. The pH values of three solutions A, B and C are given in the table. Answer the following questions: [3]

Solution	pH value
A	12
B	2
C	7

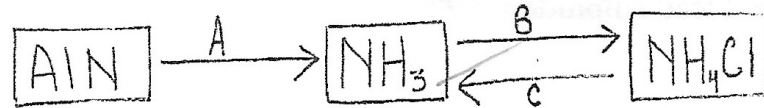
- Which solution will have no effect on litmus solution?
- Which solution will liberate CO_2 when reacted with sodium carbonate?
- Which solution will turn red litmus solution blue?



- ii. Give a balanced chemical equation for the following: [2]
 a. Reaction of ethanoic acid with ethanol
 b. Dehydrohalogenation of ethyl bromide
- iii. A hydrocarbon of vapour density 15 has 80% carbon. Calculate the molecular formula of the hydrocarbon. [C=12, H=1]. [3]
- iv. Draw the electron dot structure of hydronium ion. State the type of bonding present in it. [2]

Question 6

- i. Study the flow chart given and give balanced equations to represent the reaction A, B and C: [3]



- ii. A compound has a formula "H₂Y". Y denotes a non-metal State the following. [2]
 a. The electronic configuration of Y and the bonding present in H₂Y.
 b. The formula of the compound formed between Ca and Y.
- iii. For the preparation of the following salts, give a balanced equation in each case: [3]
 a. Copper (II) Sulphate from copper (II) oxide
 b. Lead (II) chloride from lead (II) nitrate
 c. Sodium sulphate from caustic soda
- iv. Arrange the following as per the instructions given in brackets: [2]
 a. F, C, Li, O (decreasing electron affinity)
 b. Cl, S, Si, Na (increasing electronegativity)

Question 7

- i. Copy and complete the following table which refers to the industrial method for the preparation of ammonia and sulphuric acid: [3]

Name of the compound	Name of the process	Catalytic equation (with the catalyst)
Ammonia	(a)	(b)
Sulphuric acid	(c)	(d)

- ii. With reference to homologous series of organic compound – state: [2]
 a. The vapour density of the third member of the alkane series.
 b. The molecular formula of the fourth member of the alkyne series.
- iii. Copper reacts with dilute nitric acid to give copper nitrate, water and nitric oxide.

$$3\text{Cu} + 8\text{HNO}_3 \rightarrow 3\text{Cu}(\text{NO}_3)_2 + 4\text{H}_2\text{O} + 2\text{NO}$$
 Calculate (i) the mass of copper needed to react with 126g of HNO₃ (ii) volume of nitric oxide obtained at the same time [Cu = 64, H = 1, O = 16, N = 14]. [3]
- iv. Rewrite each incorrect statement in the correct form: [2]
 a. The basicity of a diacidic base is two.
 b. Denatured alcohol is methyl alcohol with 5% ethyl alcohol, a coloured dye and some pyridine.

Question 8

- i. Study the extract of the Periodic Table given below and answer the questions that follow.
Give the alphabet corresponding to the element in question. DO NOT repeat an element. [3]

A																					

- a. Which element forms electrovalent compound with G?
b. The ion of which element will migrate towards the cathode during electrolysis?
c. Which non-metallic element has the valency of 2?
- ii. Give balanced equation for the conversion of: [2]
a. Complete combustion of ethane
b. Ammonia to nitrogen trichloride
- iii. Name the anion in each of the following compounds: [3]
a. Compound X reacts with barium chloride solution to give a white precipitate insoluble in dilute HCl.
b. Compound Y on heating with dilute sulphuric acid, liberates a gas which turns lime water milky, but has no effect on potassium permanganate solution.
c. Compound Z on heating with concentrate sulphuric acid, liberates a gas which on bubbling through silver nitrate solution gives a white precipitate, soluble in liquor ammonia.
- iv. Give reason for the following: [2]
a. Addition reactions are characteristic of ethene while substitution reactions of ethane.
b. The electron affinity of argon in period 3 of the periodic table is zero.