
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 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) An *electrolyte* which completely dissociates into ions is:
- A. Alcohol
 - B. Carbonic acid
 - C. Sucrose
 - D. Sodium hydroxide
- (ii) The most *electronegative element* from the following elements is:
- A. Magnesium
 - B. Chlorine
 - C. Aluminium
 - D. Sulphur

This Paper consists of 9 printed pages and 1 blank page.

(iii) The reason for using *Aluminium* in the alloy duralumin is:

- A. Aluminium is brittle.
- B. Aluminium gives strength.
- C. Aluminium brings lightness.
- D. Aluminium lowers melting point.

(iv) The *drying agent* used to *dry HCl* gas is:

- A. Conc. H_2SO_4
- B. ZnO
- C. Al_2O_3
- D. CaO

(v) A hydrocarbon which is a *greenhouse gas* is:

- A. Acetylene
- B. Ethylene
- C. Ethane
- D. Methane

(b) Fill in the blanks with the choices given in brackets:

[5]

- (i) Conversion of *ethanol to ethene* by the action of *concentrated sulphuric acid* is an example of _____. (dehydration / dehydrogenation / dehydrohalogenation)
- (ii) When *sodium chloride* is heated with *concentrated sulphuric acid below 200°C* , one of the products formed is _____. (sodium hydrogen sulphate / sodium sulphate / chlorine)
- (iii) *Ammonia* reacts with *excess chlorine* to form _____. (nitrogen / nitrogen trichloride / ammonium chloride)
- (iv) *Substitution reactions* are characteristic reactions of _____. (alkynes / alkenes / alkanes)
- (v) In Period 3, the *most metallic* element is _____. (sodium / magnesium / aluminium)

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

- (i) Reduction of copper (II) oxide by hydrogen.
- (ii) Action of dilute sulphuric acid on sodium hydroxide.
- (iii) Action of dilute sulphuric acid on zinc sulphide.
- (iv) Ammonium hydroxide is added to ferrous sulphate solution.
- (v) Chlorine gas is reacted with ethene.

(d) State one observation for each of the following: [5]

- (i) Concentrated nitric acid is reacted with sulphur.
- (ii) Ammonia gas is passed over heated copper (II) oxide.
- (iii) Copper sulphate solution is electrolysed using copper electrodes.
- (iv) A small piece of zinc is added to dilute hydrochloric acid.
- (v) Lead nitrate is heated strongly in a test tube.

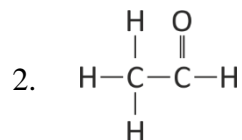
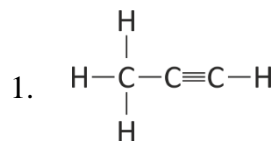
(e) (i) Calculate: [5]

- 1. The number of moles in 12g of oxygen gas. [O = 16]
- 2. The weight of 10^{22} atoms of carbon.

[C = 12, Avogadro's No. = 6×10^{23}]

(ii) Molecular formula of a compound is $C_6H_{18}O_3$. Find its empirical formula.

(f) (i) Give the IUPAC name of the following organic compounds: [5]



- (ii) What is the special feature of the structure of ethyne?
- (iii) Name the saturated hydrocarbon containing two carbon atoms.
- (iv) Give the structural formula of Acetic acid.
- (g) Give the appropriate term defined by the statements given below: [5]
- (i) The formula that represents the simplest ratio of the various elements present in one molecule of the compound.
- (ii) The substance that releases hydronium ion as the only positive ion when dissolved in water.
- (iii) The tendency of an atom to attract electrons towards itself when combined in a covalent compound.
- (iv) The process by which certain ores, specially carbonates, are converted to oxides in the absence of air.
- (v) The covalent bond in which the electrons are shared equally between the combining atoms.
- (h) Arrange the following according to the instructions given in brackets: [5]
- (i) K, Pb, Ca, Zn. (In the increasing order of the reactivity)
- (ii) Mg^{2+} , Cu^{2+} , Na^{1+} , H^{1+} (In the order of preferential discharge at the cathode)
- (iii) Li, K, Na, H (In the decreasing order of their ionization potential)
- (iv) F, B, N, O (In the increasing order of electron affinity)
- (v) Ethane, methane, ethene, ethyne. (In the increasing order of the molecular weight) [H = 1, C = 12]

Attempt any four questions from this Section

(a) Draw the electron dot structure of: [3]

(i) Nitrogen molecule [N = 7]

(ii) Sodium chloride [Na = 11, Cl = 17]

(iii) Ammonium ion [N = 7, H = 1]

(b) 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

- (i) Which solution will have no effect on litmus solution?
- (ii) Which solution will liberate CO_2 when reacted with sodium carbonate?
- (iii) Which solution will turn red litmus solution blue?
- (c) 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. [4]

[illegible]

- (i) Which element forms electrovalent compound with G?
- (ii) The ion of which element will migrate towards the cathode during electrolysis?
- (iii) Which non-metallic element has the valency of 2?
- (iv) Which is an inert gas?

Question 3

- (a) Name the particles present in: [3]
- (i) Strong electrolyte
 - (ii) Non- electrolyte
 - (iii) Weak electrolyte
- (b) Distinguish between the following pairs of compounds using the reagent given in the bracket. [3]
- (i) Manganese dioxide and copper (II) oxide. (using concentrated HCl)
 - (ii) Ferrous sulphate solution and ferric sulphate solution. (using sodium hydroxide solution)
 - (iii) Dilute hydrochloric acid and dilute sulphuric acid. (using lead nitrate solution)
- (c) Choose the method of preparation of the following salts, from the methods given in the list: [4]
- [List: A. Neutralization B. Precipitation
C. Direct combination D. Substitution]
- (i) Lead chloride
 - (ii) Iron (II) sulphate
 - (iii) Sodium nitrate
 - (iv) Iron (III) chloride

Question 4

- (a) Complete the following equations: [3]
- (i) $S + \text{conc. HNO}_3 \rightarrow$
 - (ii) $C + \text{conc. H}_2\text{SO}_4 \rightarrow$
 - (iii) $\text{Cu} + \text{dil. HNO}_3 \rightarrow$

- (b) Write a balanced chemical equation for the preparation of: [3]
- (i) Ethene from bromoethane
 - (ii) Ethyne using calcium carbide
 - (iii) Methane from sodium acetate.
- (c) Name the following organic compounds: [4]
- (i) The compound with 3 carbon atoms whose functional group is a carboxyl.
 - (ii) The first homologue whose general formula is C_nH_{2n} .
 - (iii) The compound that reacts with acetic acid to form ethyl ethanoate.
 - (iv) The compound formed by complete chlorination of ethyne.

Question 5

- (a) Give the chemical formula of: [3]
- (i) Bauxite
 - (ii) Cryolite
 - (iii) Sodium aluminate
- (b) Answer the following questions based on the extraction of aluminium from alumina by **Hall-Heroult's Process**.: [3]
- (i) What is the function of cryolite used along with alumina as the electrolyte?
 - (ii) Why is powdered coke sprinkled on top of the electrolyte?
 - (iii) Name the electrode, from which aluminium is collected.

- (c) Match the alloys given in column I to the uses given in column II: [4]

COLUMN I	COLUMN II
(i) Duralumin	A. Electrical fuse
(ii) Solder	B. Surgical instruments
(iii) Brass	C. Aircraft body
(iv) Stainless Steel	D. Decorative articles

Question 6

- (a) Identify the substances underlined: [3]

- (i) The catalyst used to oxidise ammonia.
(ii) The organic compound which when solidified, forms an ice like mass.
(iii) The dilute acid which is an oxidizing agent.

- (b) Copper sulphate solution reacts with sodium hydroxide solution to form a precipitate of copper hydroxide according to the equation: [3]



- (i) What mass of copper hydroxide is precipitated by using 200 gm of sodium hydroxide?

[H = 1, O = 16, Na = 23, S = 32, Cu = 64]

- (ii) What is the colour of the precipitate formed?

- (c) Find the **empirical formula** and the **molecular formula** of an organic compound from the data given below: [4]

C = 75.92%, H = 6.32% and N = 17.76%

The vapour density of the compound is 39.5.

[C = 12, H = 1, N = 14]

Question 7

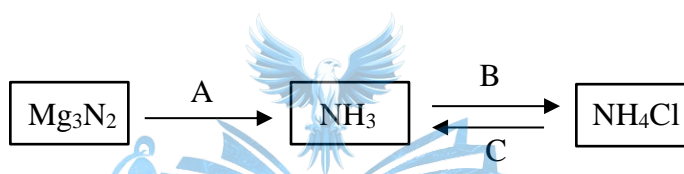
(a) Name the gas evolved in each of the following cases: [3]

(i) Alumina undergoes electrolytic reduction.

(ii) Ethene undergoes hydrogenation reaction.

(iii) Ammonia reacts with heated copper oxide.

(b) Study the flow chart given and give balanced equations to represent the reactions **A**, **B** and **C**: [3]



(c) Copy and complete the following table which refers to the **industrial method for the preparation** of ammonia and sulphuric acid: [4]

Name of the compound	Name of the process	Catalytic equation (with the catalyst)
Ammonia	(i) _____	(ii) _____
Sulphuric acid	(iii) _____	(iv) _____