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

(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]

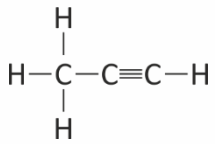
1. The number of moles in 12g of oxygen gas. [O = 16]

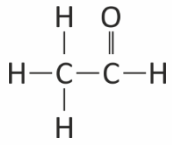
2. The weight of 10^{22} atoms of carbon.

[C = 12, Avogadro's No. = 6 x 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]

1. 

2. 

(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]

SECTION II (40 Marks)

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

Question 2

(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]

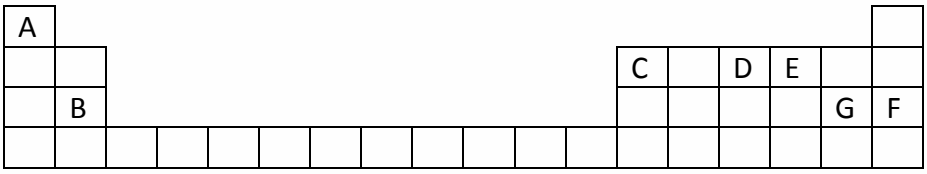
Solution	pH value
A	12
B	2
C	7

(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]



(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 + conc. HNO_3 →

(ii) C + conc. H_2SO_4 →

(iii) Cu + dil. HNO_3 →

(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 <u>catalyst</u> used to oxidise ammonia.

(ii) The <u>organic compound</u> which when solidified, forms an ice like mass.

(iii) The <u>dilute acid</u> 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]

$$2NaOH + CuSO_4 \rightarrow Na_2SO_4 + Cu(OH)_2 \downarrow$$

(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

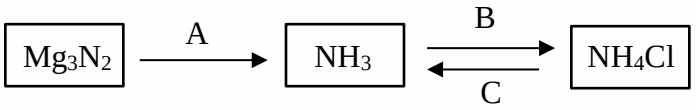
(a) Name the gas evolved in each of the following cases: [3]

(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)_____