The following question paper is based only on the syllabus for Semester 2 examination. To test your knowledge on the remaining syllabus, kindly visit our website for an exhaustive MCQ based question bank.

SEMESTER 2 EXAMINATION 2022

(Chemistry)

SCIENCE PAPER 2

Maximum Marks 40

Time Allowed: One and a half hours

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

You will not be allowed to write during the first 10 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.

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*Attempt **all** questions from **Section A** and **any three** questions from **Section B**.*

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

SECTION A

*(Attempt **all** questions)*

***Question* 1**

Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.) **[10]**

(i) The ore of Aluminium is:

(a) Calamine (b) Haematite (c) Magnetite (d) Cryolite

Ans. (d) Cryolite

(ii) Hydrogen chloride gas is not collected over water, as:

(a) It is highly soluble in water. (b) It is less soluble in water.

(c) It is lighter than air. (d) It is heavier than air.

Ans. (a) It is highly soluble in water

(iii) An aqueous solution of ammonia is:

(a) Neutral (b) Acidic (c) Basic (d) Amphoteric

Ans. (c) Basic

(iv) The acid which is *least* volatile is:

(a) Hydrochloric acid (b) Nitric acid (c) Dilute sulphuric acid (d) Concentrated sulphuric acid

Ans. (d) Concentrated sulphuric acid

(v) The gas formed, when calcium bisulphite reacts with dilute HNO_3:

(a) Sulphur trioxide (b) Hydrogen (c) Sulphur dioxide (d) Hydrogen sulphide

Ans. (c) Sulphur dioxide

(vi) The IUPAC name of formic acid:

(a) Propanoic acid (b) Methanoic acid (c) Ethanoic acid (d) Butanoic acid

Ans. (b) Methanoic acid

(vii) The metallic oxide which when reacts with HCI forms salt and water:

(a) Carbon monoxide (b) Nitrous oxide (c) Ammonium hydroxide (d) Sodium oxide

Ans. (d) Sodium oxide

(viii) Vanadium pentoxide is used as a catalyst in the preparation of:

(a) Nitrogen gas (b) Nitrogen dioxide gas (c) Sulphur trioxide gas (d) Carbon dioxide gas

Ans. (c) Sulphur trioxide gas

(ix) The Catalyst used for the conversion of Ethene to Ethane:

(a) Iron (b) Nickel (c) Cobalt (d) Molybdenum

Ans. (b) Nickel

(x) *Substance* which helps to lower the fusion point of the mixture in Hall Heroult Process:

(a) Coke (b) Concentrated sodium hydroxide

(c) Fluorspar (d) Concentrated potassium hydroxide

Ans. (c) Fluorspar

SECTION B

*(Attempt **any three** questions from this Section)*

Question 2

(i) Define: **[2]**

(a) Isomerism

Ans. Compounds having the same molecular formula but different structural formulae are known as isomers and the phenomenon is known as isomerism.

(b) Ores

Ans. Ores are those minerals from which metals are extracted commercially at a comparatively lower cost and with minimum efforts.

(ii) Name the following: **[2]**

(a) The property by which carbon links with itself to form a long chain.

Ans. Catenation

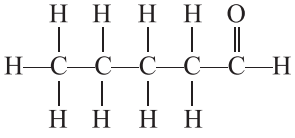
(b) The saturated (mistake, should be *unsaturated*) hydrocarbons having general formula C_nH_{2n-2}

Ans. Alkynes

(iii) Draw the structural diagrams of: **[3]**

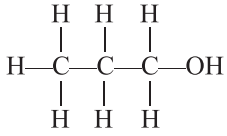
(a) pentanal

Ans.



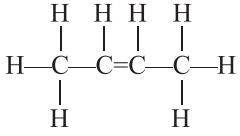
(b) propanol

Ans.



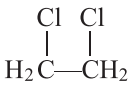
(c) 2-butene

Ans.



(iv) Complete and balance the following chemical equations: **[3]**

(a) $H_2C = CH_2 + Cl_2 \xrightarrow[\text{Inert solvent}]{CCl_4}$

Ans. $H_2C = CH_2 + Cl_2 \xrightarrow[\text{Inert solvent}]{CCl_4}$ 

(b) $C_2H_6 + O_2$ [excess] $\rightarrow$

Ans. $2C_2H_6 + 7O_2$ [excess] $\rightarrow 4CO_2 + 6H_2O$

(c) $CH_4 + O_2$ [excess] $\rightarrow$

Ans. $CH_4 + 2O_2$ [excess] $\rightarrow CO_2 + 2H_2O$

***Question* 3**

(i) State the following: **[2]**

(a) A compound formed when excess ammonia gas reacts with chlorine.

Ans. Ammonium chloride and nitrogen

(b) A substance added to water, to manufacture sulphuric acid in Contact process.

Ans. Pyrosulphuric acid ($H_2S_2O_7$)

(ii) Identify the gas P and Q in the reactions given below: **[2]**

(a) A compound reacts with an acid to form gas **P** which has no effect on acidified $K_2Cr_2O_7$ solution but turns lime water milky.

Ans. Carbon dioxide

(b) A metallic nitrate reacts on heating gives oxygen gas along with a coloured gas **Q**.

Ans. Q is Nitrogen dioxide, metallic nitrate can be zinc nitrite, lead nitrite, etc.

(iii) State the **observation** for the following: **[3]**

(a) Dry ammonia gas reacts with oxygen in the presence of a catalyst.

Ans. Gas evolved (NO) turns brown on exposure to air.

(b) Excess chlorine gas reacts with ammonia gas.

Ans. Yellow, oily, explosive compound (NCl_3) is formed.

(c) Carbon reacts with hot concentrated nitric acid.

Ans. Brown gas NO_2 is evolved.

(iv) Write **balanced equation** for the following conversions: **[3]**

(a) Carbon from cane sugar and concentrated sulphuric acid.

Ans. $C_{12}H_{22}O_{11}$ + conc. $H_2SO_4 \rightarrow 12C + 11H_2O$

(b) Ferric nitrate from ferric hydroxide and nitric acid.

Ans. $Fe(OH)_3 + 3HNO_3 \rightarrow Fe(NO_3)_3 + 3H_2O$

(c) Ammonium sulphate from ammonium hydroxide and sulphuric acid.

Ans. $2NH_4OH + H_2SO_4 \rightarrow (NH_4)_2SO_4 + 2H_2O$

***Question* 4**

(i) State the **relevant reason** for the following: **[2]**

(a) Concentrated alkali is used for the concentration of bauxite ore.

Ans. Bauxite ore has Aluminium oxide which is amphoteric in nature. An amphoteric oxide dissolves in caustic alkalies.

(b) Fused alumina is reduced to aluminium by electrolysis.

Ans. Aluminium has great affinity towards oxygen so Aluminium cannot be reduced by common reducing agents. It can be reduced only by electrolysis.

(ii) State **one use** of the given alloys: **[2]**

(a) Magnalium

Ans. In aircrafts, metal mirrors, light tools, scientific instruments.

(b) Duralumin

Ans. In light tools, bodies of aircrafts, buses and tube trains, pressure cookers.

(iii) Complete the table given below which refers to the Laboratory preparation of **Ammonia gas**. **[3]**

Laboratory preparation	Reactants used	Products formed	Drying agent	Method of collection
Ammonia gas	(a)	Calcium chloride + water + ammonia	(b)	(c) .....

Ans.

Laboratory preparation	Reactants used	Products formed	Drying agent	Method of collection
Ammonia gas	**Ammonium chloride and calcium hydroxide**	Calcium chloride + water + ammonia	**Quick lime (CaO)**	**Downward displacement of air**

(iv) Identify the terms for the following: **[3]**

(a) The process used to purify Alumina by electrolytic reduction.

Ans. Hall — Heroult's Process

(b) The experiment used to demonstrate the high solubility of HCl gas.

Ans. Fountain experiment

(c) The chemical property of sulphuric acid to form two types of salts with an alkali.

Ans. Dibasic acid

***Question* 5**

(i) Write the balanced chemical equation for the following: **[2]**

(a) Action of heat on manganese dioxide and concentrated hydrochloric acid.

Ans. $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(b) Zinc reacts with dilute hydrochloric acid to form zinc chloride.

Ans. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

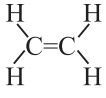
(ii) Select the right answer from the brackets and complete the statements: **[2]**

In electrolysis of fused Alumina, the anode is made of (a) ..... [gas carbon/graphite] and the product formed at cathode is (b) ..... [oxygen/aluminium].

Ans. In electrolysis of fused Alumina, the anode is made of (a) **graphite** and the product formed at cathode is (b) **aluminium**.

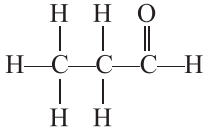
(iii) Give the IUPAC name for the following: **[3]**

(a)



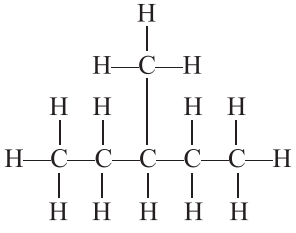
Ans. Ethene

(b)



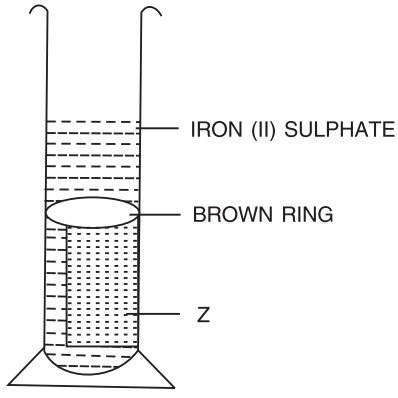
Ans. Propanal

(c)



Ans. 3-methyl pentane

(iv) Study the diagram, which shows the Brown Ring Test and answer the questions given below: **[3]**



Brown Ring Test

(a) Which ion is determined by Brown Ring Test?

Ans. Nitrate ion

(b) Why is freshly prepared iron (II) sulphate used in the test?

Ans. On exposure to atmosphere, iron (II) sulphate is oxidized to ferric sulphate which will not give a brown ring.

(c) Name the substance Z.

Ans. Conc. H_2SO_4.

***Question* 6**

(i) Distinguish between the following as directed: **[2]**

(a) Sodium sulphite solution and sodium sulphate solution.

[using dilute H_2SO_4]

Ans. On adding dilute H_2SO_4 to sodium sulphite, sulphur dioxide gas is evolved. This gas turns acidified $K_2Cr_2O_7$ paper green.

No observation in sodium sulphate.

(b) Lead salt solution and zinc salt solution.

[using NH_4OH solution in excess]

Ans. On adding NH_4OH solution, white precipitate appears in both the salt solutions. Upon adding excess NH_4OH solution to zinc salt solution, the precipitate dissolves, while the precipitate of lead hydroxide does not dissolve in excess of NH_4OH.

(ii) Give one word for the following statements: **[2]**

(a) The compounds of various metals found in nature with earthly impurities.

Ans. Minerals

(b) A homogeneous mixture of two or more metals or a metal and a non-metal in specific ratios.

Ans. Alloy

(iii) Identify **the acid** in each case: **[3]**

(a) The acid formed when Sulphur reacts with concentrated nitric acid.

Ans. Sulphuric acid

(b) An acid, which on adding to lead nitrate solution produces a white precipitate which is soluble on heating.

Ans. Hydrochloric acid

(c) The acid formed when potassium nitrate reacts with a least volatile acid.

Ans. Nitric acid

(iv) Match column A with column B: **[3]**

Name (A)	**Functional Group (B)**
1. Aldehyde	(a) –OH
2. Carboxylic acids	(b) –CHO
3. Alcohol	(c) –COOH

Ans.

Name (A)	**Functional Group (B)**
1. Aldehyde	(b) –CHO
2. Carboxylic acids	(c) –COOH
3. Alcohol	(a) –OH