

FIITJEE

ICSE PART TEST – II

CHEMISTRY

Time: 1:30 Hours

Max Marks: 40

Instructions:

- Section – A (20 Marks): Attempt all questions from this section.**
Q.1(a) 5 Multiple Choice Questions (MCQs) - 1 Mark each
(b) 5 Very Short Answer Type (VSA) - 1 Mark each
(c) 5 Very Short Answer Type (VSA) - 1 Mark each
(d) 5 Very Short Answer Type (VSA) - 1 Mark each
- Section – B (20 Marks): Attempt any 2 questions from this section.**
Q2. (a) 5 Very Short Answer Type (VSA) - 1 Mark each, (b) 5 Fill ups - 1 Mark each
Q3. (a) 5 Marks, (b) 5 Mark
Q4. (a) 6 Marks, (b) 4 Mark
Q5. (a) 6 Marks, (b) 4 Marks
- Wherever necessary, neat and properly labeled diagram should be drawn.

Name of the Candidate :

Enroll Number :

Date of Examination :

SECTION-A (20 Marks)

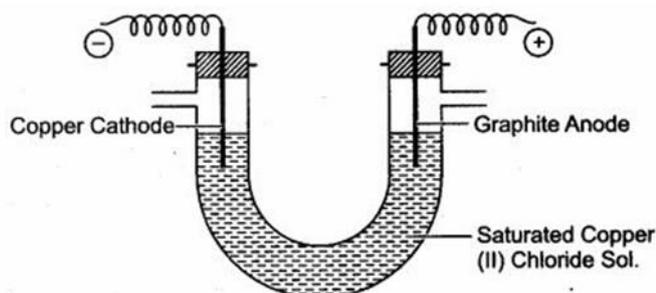
- 1.(a) (i) The reason for using Aluminium in the alloy duralumin is: [1]
(A) Aluminium is brittle (B) Aluminium gives strength
(C) Aluminium brings lightness (D) Aluminium lowers melting point
- (ii) The organic compound which undergoes substitution reaction is: [1]
(A) C₂H₂ (B) C₂H₄
(C) C₁₀H₁₈ (D) C₂H₆
- (iii) The electrolysis of acidified water is an example of: [1]
(A) Reduction (B) Oxidation
(C) Redox reaction (D) Synthesis
- (iv) An electrolyte which completely dissociates into ions is: [1]
(A) Alcohol (B) Carbonic acid
(C) Sucrose (D) Sodium hydroxide
- (v) If the molecular formula of an organic compound is C₁₀H₁₈ it is: [1]
(A) alkene (B) alkane
(C) alkyne (D) Not a hydrocarbon
- (b) Identify the substance underlined, in each of the following cases:
(i) The electrolyte used for electroplating an article with silver. [1]
(ii) The particles present in a liquid such as kerosene, that is a non electrolyte. [1]
(iii) An organic compound containing – COOH functional group. [1]
(iv) At the anode, when molten lead bromide is electrolyzed using graphite electrodes. [1]
(v) Substitution reactions are characteristic reactions of [1]
- (c) Name the gas that is produced in each of the following cases:
(i) Sulphur is oxidized by concentrated nitric acid. [1]
(ii) Electrolysis of aqueous sodium chloride solution will form at the cathode. [1]
(iii) Action of cold and dilute nitric acid on copper. [1]
(iv) At the anode during the electrolysis of acidified water. [1]
(v) Reaction of ethanol and sodium. [1]
- (d) (i) Draw the structural formula for each of the following:
1) 2, 3 – dimethyl butane [1]
2) diethyl ether [1]
3) propanoic acid [1]
- (ii) From the list of terms given, choose the most appropriate term to match the given description. (calcination, roasting, pulverisation, smelting)
1) Crushing of the ore into a fine powder. [1]
2) Heating of the ore in the absence of air to a high temperature. [1]

SECTION – B (20 Marks)

2. (a) M is a metal above hydrogen in the activity series and its oxide has the formula M₂O. This oxide when dissolved in water forms the corresponding hydroxide which is a good conductor of electricity. In the above context answer the following:
(i) What kind of combination exists between M and O ?
(ii) How many electrons are there in the outermost shell of M ?
(iii) Name the group to which M belongs.
(iv) State the reaction taking place at the cathode.
(v) Name the product at the anode.

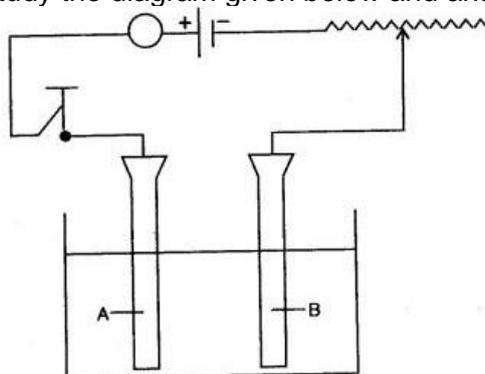
2. (b) Fill in the blanks with the choices given in brackets.
- Metals are good (oxidizing agents/reducing agents) because they are electron (acceptors/donors). [1]
 - Conversion of ethene to ethane is an example of (hydration /hydrogenation) [1]
 - The compound formed when ethene reacts with Hydrogen is (CH₄, C₂H₆, C₃H₈) [1]
 - Substitution reactions are characteristic reactions of (alkynes / alkenes /alkanes) [1]
 - When sodium chloride is heated with concentrated sulphuric acid below 200°C, one of the products formed is(sodium hydrogen sulphate / sodium sulphate chlorine) sodium hydrogen sulphate [1]
- 3.(a)
- Which two gases are combined during contact process? [1]
 - Write the equation for the reaction between zinc and the final product of the contact process ? [1]
 - What happens when sulphur trioxide gas is passed into concentrated sulphuric acid. [1]
 - Name the catalyst used in the contact process. [1]
 - What property of sulphuric acid is shown by the reaction of concentrated sulphuric acid when heated with (a) potassium nitrate (b) carbon? [1]
- 3.(b)
- (a) Give balanced chemical equations for the following conversions:
- Ethanoic acid to ethyl ethanoate [1]
 - Calcium carbide to ethyne [1]
 - Sodium ethanoate to methane [1]
- (b) Using their structural formulae identify the functional group by circling them:
- Dimethyl ether [1]
 - Propanone [1]
4. (a) (1) Give the chemical formula of: [3]
- Bauxite
 - Cryolite
 - Sodium aluminate
- (2) Answer the following questions based on the extraction of aluminium from alumina by Hall – Heroult’s Process: [3]
- What is the function of cryolite used along with alumina as the electrolyte?
 - Why is powdered coke sprinkled on top of the electrolyte?
 - Name the electrode, from which aluminium is collected.
- 4.(b) Calculate the percentage by weight of: [4]
- C in carbon dioxide
 - Na in sodium carbonate
 - Al in aluminium nitride
 - Oxygen in ammonium nitrate
- [C = 12, O = 16, H = 1, Na = 23, Al = 27, N = 14]

- 5 (a) A saturated aqueous copper (II) chloride is electrolysed using graphite anode and copper cathode as illustrated in diagram given below: [6]



- (i) Name the ions which will migrate to cathode.
- (ii) Name the ions which will migrate to anode.
- (iii) Which ion is likely to discharge at cathode and why?
- (iv) Write ionic equation for reaction taking place at cathode.
- (v) Which ion is likely to discharge at anode ?
- (vi) Write ionic equation for reaction taking place at anode..

5. (b) (i) Study the diagram given below and answer the questions that follows: [4]



- (a) Give the names of the electrodes A and B.
- (b) Which electrode is the oxidizing electrode ?
- (ii) A strip of copper is placed in four different colourless salt solutions. They are KNO_3 , AgNO_3 , $\text{Zn(NO}_3)_2$, $\text{Ca(NO}_3)_2$. Which one of the solutions will finally turn blue ?
- (iii) Write the equations of the reactions which take place at the cathode and anode when acidified water is electrolysed.

HINTS & SOLUTIONS

SECTION – A

1. (a)

(i) C

Sol. Aluminium brings lightness

(ii) (D)

Sol. The organic compound which undergoes substitution reaction is C_2H_6 .

(iii) C

Sol. The electrolysis of acidified water is an example of Redox reaction.

(iv) D

Sol. An electrolyte which completely dissociates into ions is Sodium hydroxide

(v) C

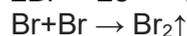
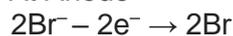
Sol. If the molecular formula of an organic compound is $C_{10}H_{18}$ it is alkyne.

1. (b) (i) Sodium argento cyanide

(ii) Molecules

(iii) Carboxylic acid

(iv) At Anode



At anode reddish vapours of bromine escape in air from lead bromide.

(v) alkanes

1. (c) (i) Nitrogen dioxide

(ii) hydrogen gas

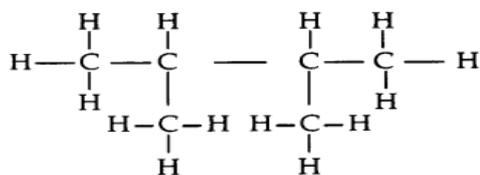
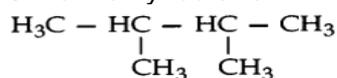
(iii) nitrogen monoxide

(iv) oxygen

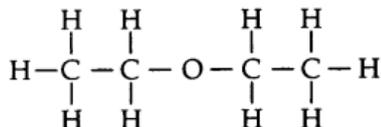
(v) hydrogen

1. (d)

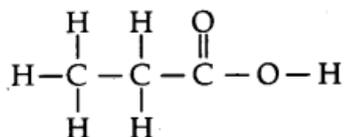
(i) 1) 2, 3 – dimethyl butane



2) (diethyl ether) $C_2H_5 - O - C_2H_5$



3) propanoic acid $CH_3 - CH_2 - COOH$

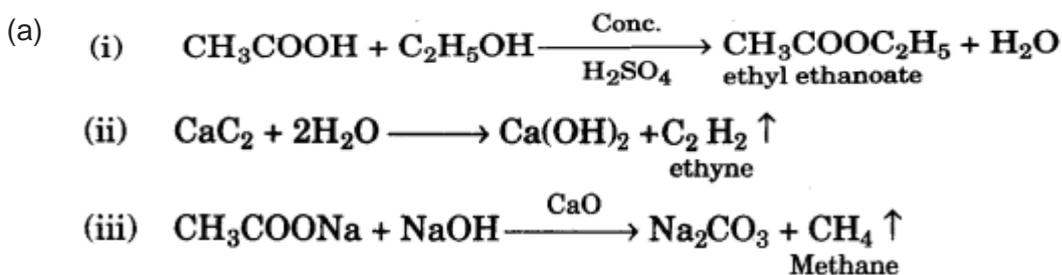


- (ii) 1) Pulverisation
2) Calcination

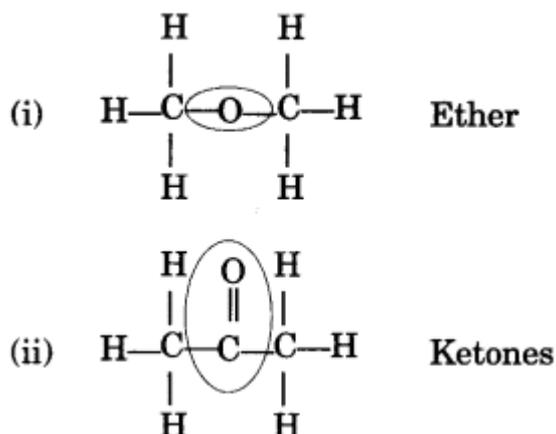
SECTION – B

- 2.(a) (i) Electrovalent bond exists between M and O.
(ii) One electron is there in the outermost shell.
(iii) M belongs to First group.
(iv) $M^+ + e^- \rightarrow M$ (at cathode).
 $M + M \rightarrow M_2$
(v) Oxygen gas is liberated at anode
2. (b) (i) Reducing agents, donors
(ii) Hydrogenation
(iii) C_2H_6
(iv) alkanes
(v) sodium hydrogen sulphate
3. (a) (i) SO_2 and O_2 (sulphur dioxide and oxygen)
(ii) $Zn + 2H_2SO_4$ (Conc.) $\rightarrow ZnSO_4 + 2H_2O + SO_2$
(iii) Sulphur trioxide gas dissolves in concentrated sulphuric acid to form fuming sulphuric acid, commonly known as oleum.
 $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$ (Oleum)
(iv) Platinized asbestos or V_2O_5
(v) (a) Non-volatile nature. (b) Oxidising property

3. (b)



(b)



4. (a) (1) (i) $Al_2O_3 \cdot 2H_2O$

(ii) Na_3AlF_6

(iii) $NaAlO_2$

- (2) (i) Cryolite acts as a solvent and lower the fusion temperature from $2050^\circ C$ to $950^\circ C$.
(ii) A layer of powdered coke is sprinkled over the surface of the electrolyte to reduce the heat loss by radiation and prevent the carbon rod from binning in air.
(iii) Cathode

4.(b)

(a) Weight of C = 12

Weight of CO₂ = 12 + 2 (16) = 44

$$\% \text{ age of C in CO}_2 = \frac{\text{wt. of carbon}}{\text{wt. of CO}_2} \times 100$$

$$= \frac{12}{44} \times 100 = \frac{300}{11} = 27.27\%$$

⇒ Percentage of C in CO₂ = 27.3%

(b) Wt. of sodium carbonate Na₂CO₃

= 2 (Na) + C + 3 (O)

$$= 2 (23) + 12 + 3 (16)$$

$$= 46 + 12 + 48 = 106$$

$$\text{Percentage of sodium in Na}_2\text{CO}_3 = \frac{\text{wt. of Na}}{\text{wt. of Na}_2\text{CO}_3} \times 100$$

$$= \frac{46}{106} \times 100 = 43.4\%$$

(c) Weight of Aluminium nitride AlN

Molecular weight of AlN = 27 + 14 = 41g

$$\text{Percentage of Aluminium} = \frac{\text{wt. of Al}}{\text{wt. of AlN}} \times 100$$

$$= \frac{27}{41} \times 100 = 65.85\%$$

(d) Molar mass of NH₄NO₃ (or N₂H₄O₃)

$$= 14 \times 2 + 4 + 16 \times 3 = 80 \text{ g mol}^{-1}$$

∴ Mass of 1 mole of NH₄NO₃ = 80 g

Mass of oxygen in 1 mole of NH₄NO₃ = 16 × 3 = 48 g

$$\text{Percentage of oxygen in amm. nitrate} = \frac{48}{80} \times 100 = 60\%$$

5.

(a) (i) Copper ions (Cu²⁺) and hydrogen ions H⁺ migrate to cathode.

(ii) Chloride ions (Cl⁻) and hydroxyl ions OH⁻ migrate to anode.

(iii) Copper ions (Cu²⁺) are likely to discharge at cathode, because their position is lower than hydrogen ions H⁺ in electrochemical series.

(iv) Cu²⁺ + 2e⁻ → Cu

(v) Hydroxyl ions (OH⁻) are likely to discharge at anode, because their position is lower than chloride ion (Cl⁻) in electrochemical series.

(vi) 4OH⁻ - 4e⁻ → 2H₂O + O₂ (g).

5.

(b) (i) (a) A — Anode

B — Cathode

(b) A

(ii) AgNO₃ solution

(iii) Cathode reaction: 2H⁺ + 2e⁻ → 2H → H₂

Anode reaction: 2OH⁻ - 2e⁻ → 2OH → H₂O + O

