



Indian School Al Wadi Al Kabir

Assessment 1 (2026-2027)

Sub: Chemistry (043)

Class: XII

Date: 15/09/2026

Set- I

Max. Marks: 70

Time: 3 Hours

General Instructions:

Read the following instructions carefully and follow them:

- (i) This question paper contains **33** questions. All questions are compulsory.
- (ii) This question paper is divided into five sections – Section A, B, C, D and E.
- (iii) **Section A** – questions numbered **1 to 16** are multiple-choice type questions. Each question carries **1** mark.
- (iv) **Section B** – questions numbered **17 to 21** are very short answer type questions. Each question carries **2** marks.
- (v) **Section C** – questions numbered **22 to 28** are short answer type questions. Each question carries **3** marks.
- (vi) **Section D** – questions numbered **29 and 30** are case-based questions. Each question carries **4** marks.
- (vii) **Section E** – questions numbered **31 to 33** are long answer type questions. Each question carries **5** marks.
- (viii) There is no overall choice given in the question paper. However, an internal choice has been provided in a few questions in all the sections except Section A.
- (ix) Use of a calculator is **not** allowed.

SECTION A

Questions numbered 1 to 16 are Multiple-choice type questions, carrying 1 mark each.

16×1=16

- 1 Choose the incorrect statement.
(A) Aryl halides are extremely less reactive towards nucleophilic substitution reactions.
(B) The ortho and para isomers of halotoluene can be easily separated due to the large difference in their melting points.
(C) Grignard reagents react with alcohols to form hydrocarbons.
(D) The C-Cl bond in chlorobenzene is longer than that in chloromethane.
- 2 When a non-volatile solid is added to pure water, it will
(A) boil above 100°C and freeze above 0°C.
(B) boil below 100°C and freeze above 0°C.
(C) boil above 100°C and freeze below 0°C.
(D) boil below 100°C and freeze below 0°C.

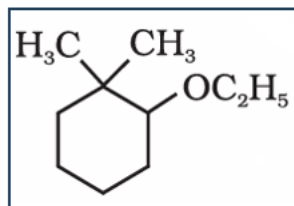
- 3 Which of the following solutions of KCl will have the highest value of molar conductivity?
 (A) 0.01 M
 (B) 1 M
 (C) 0.5 M
 (D) 0.1 M
- 4 S_N1 mechanism is favoured in which of the following solvents:
 (A) Benzene
 (B) Carbon tetrachloride
 (C) Acetic acid
 (D) Carbon disulphide
- 5 Three juice samples, A, B, and C, contain glucose as the only sugar. The concentrations of samples A, B, and C are 0.1 M, 0.5 M, and 0.2 M, respectively. The freezing point will be highest for the fruit juice;
 (A) Sample A
 (B) Sample B
 (C) Sample C
 (D) The solution with the highest vapour pressure.
- 6 During the electrolysis of aqueous NaCl, which pair of products is obtained at the cathode and anode, respectively?
 (A) Na and Cl₂
 (B) H₂ and Cl₂
 (C) H₂ and O₂
 (D) Na and O₂
- 7 Oxidation of chloroform by air in the presence of sunlight produces a poisonous gas known as:
 (A) Mustard
 (B) Tear gas
 (C) Chlorine gas
 (D) Phosgene gas

- 8 Match the following and choose the correct option.

Column I	Column II
p. Oxidising agent	i. Benzene
q. Phenol with Zn dust	ii. Ether
r. Williamson synthesis	iii. PCC
s. Reimer-Tiemann reaction	iv. Salicylaldehyde

- (A) p – i, q – iii, r – ii, s – iv
 (B) p – iii, q – i, r – ii, s – iv
 (C) p – iii, q – ii, r – i, s – iv
 (D) p – ii, q – iii, r – iv, s – i
- 9 Formaldehyde is used in the preparation of:
 (A) Bakelite
 (B) Nylon
 (C) PVC
 (D) Teflon
- 10 Aromatic carboxylic acids generally do not undergo Friedel–Crafts reactions. This is because:

- (A) The carboxyl group strongly activates the benzene ring.
 (B) The carboxyl group deactivates the ring and forms a complex with AlCl_3 .
 (C) The carboxyl group reacts rapidly with the alkylating or acylating agent.
 (D) Aromatic carboxylic acids do not undergo electrophilic substitution reactions.
- 11 Ethanal undergoes nucleophilic addition reactions with HCN, whereas ethanoic acid does not. The correct reason is:
 (A) The carbonyl carbon of ethanal is more electrophilic than that of ethanoic acid.
 (B) Ethanal contains a hydrogen atom attached to the carbonyl carbon, whereas ethanoic acid does not.
 (C) Ethanoic acid is a stronger acid than ethanal and therefore cannot undergo nucleophilic addition reactions.
 (D) The carboxyl group is an electron-withdrawing group and hence does not react with HCN.
- 12 Give the IUPAC name of the following compound.
- (A) 1-Ethoxy-2-dimethylcyclohexane
 (B) 1-Ethoxy-2,2-dimethylcyclohexane
 (C) 1-Dimethyl-2-ethoxycyclohexane
 (D) 2-Ethoxy-1,1-dimethylcyclohexane

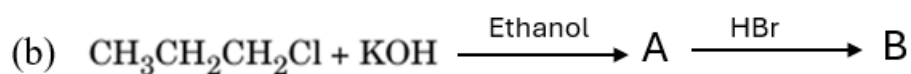
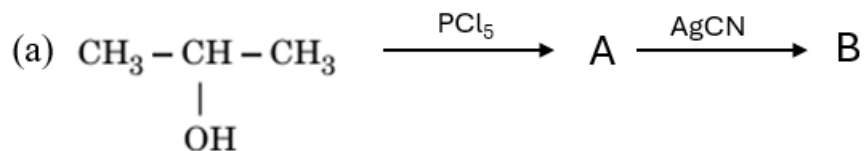


For Questions numbered 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.
- 13 **Assertion(A):** The C-O-C bond angle in ethers is slightly less than the tetrahedral bond angle.
Reason(R): There is a repulsive interaction between the two bulky groups in ethers.
- 14 **Assertion(A):** All aldehydes can be distinguished from ketones using Fehling's reagent.
Reason(R): Ketones do not form a reddish-brown ppt with Fehling's reagent.
- 15 **Assertion(A):** Ethanoic acid generally undergoes association in benzene.
Reason(R): The van't Hoff factor for association is greater than 1.
- 16 **Assertion(A):** A galvanic cell can behave as an electrolytic cell when an external potential greater than the cell potential is applied in the opposite direction.
Reason(R): When the applied external potential exceeds the cell potential, the spontaneous cell reaction is reversed, and the cell reaction becomes non-spontaneous.

SECTION B

- 17 Predict the products in the following reactions. 1+1=2



- 18 (a) Analyse the following table and answer the questions. 1+1=2

Compound	Observation with NaOH
Propan-1-ol	No reaction
Phenol	Dissolves forming salt
Water	Very weak reaction
2-Methylpropan-2-ol	No reaction

- (i) Why does phenol react with NaOH, whereas ethanol does not?
 (ii) Arrange the above compounds in increasing order of acidic strength.

OR

- (b) Account for the following statements. 1+1=2
 (i) The ortho and para nitrophenols can be separated by steam distillation.
 (ii) Bimolecular dehydration of alcohols is not an appropriate method for the preparation of Ethyl methyl ether.

- 19 Account for the following statements. 1+1=2

- (a) Dry hydrogen chloride is used in the nucleophilic addition reaction of ketones with ethylene glycol.
 (b) Although the phenoxide ion has more resonating structures than the carboxylate ion, carboxylic acid is a stronger acid than phenol.

- 20 Explain the following. 1+1=2

- (a) A person who consumes a large amount of salty food regularly may experience swelling or puffiness in certain parts of the body.
 (b) A farmer notices that fish in a pond are more active in winter than during very hot summer days.

- 21 Rusting is considered an electrochemical phenomenon. Explain. 2

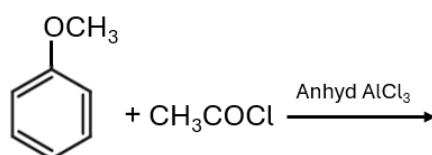
SECTION C

- 22 Explain the following with a suitable example/chemical reaction. 3×1=3

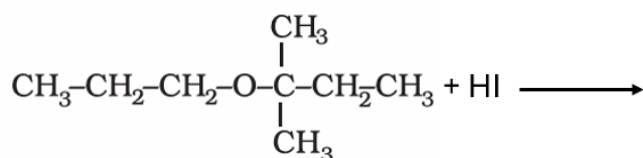
- (a) Ambident nucleophiles
 (b) Sandmeyer's reaction
 (c) Fittig reaction

- 23 Predict the product(s). 3×1=3

(i)



(ii)



(iii)



24(a)

3×1=3

- (i) Write a simple chemical test to distinguish between Ethanol and Propanone.
- (ii) Convert ethanoic acid to ethanal.
- (iii) The nucleophilic addition of sodium hydrogensulphite is useful for the separation and purification of aldehydes. Explain.

OR

- (b) Arrange the following compounds in increasing order of the property mentioned in the parentheses.

3×1=3

- (i) Benzaldehyde, p-Tolualdehyde, p-Nitrobenzaldehyde, Acetophenone (Nucleophilic addition)
- (ii) Ethanoic acid, Ethanal, Ethanol (Boiling point)
- (iii) Benzoic acid, 4-Methoxybenzoic acid, 4-Nitrobenzoic acid (Acidic character)

25

- (a) Write the mechanism for the acid-catalysed hydration of alkenes to form alcohols.

2

- (b) Bromination of phenol takes place even in the absence of a Lewis acid catalyst like FeBr₃. Give a reason.

1

26

- An organic compound (A) having molecular formula C₅H₁₀O can show various properties depending on its structures. Draw each of the structures if it :

- (i) gives a positive iodoform test
 - (ii) shows Cannizzaro reaction
 - (iii) reduces Tollens' reagent and has a chiral carbon
- Write their IUPAC names.

3

27

- Calculate the freezing point of a solution containing 0.5 g KCl (Molar mass = 74.5 g mol⁻¹) dissolved in 100 g water, assuming KCl to be 92% ionised.
K_f of water = 1.86 K kg mol⁻¹

3

28

- (i) Write two advantages of fuel cells over primary and secondary batteries.
- (ii) State Faraday's first law of electrolysis.
- (iii) How much charge in Faraday is required for the reduction of 1 mol of Al³⁺ to Al?

3

SECTION D

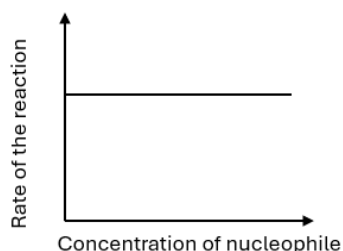
The following questions are case-based questions. Read the case carefully and answer the questions that follow.

29

- In chemistry, a nucleophilic substitution (S_N) is a class of chemical reactions in which an electron-rich chemical species (known as a nucleophile) replaces a functional group within another electron-deficient molecule (known as the electrophile).
The two main mechanisms proposed for nucleophilic substitutions are the S_N1 reaction and the S_N2 reaction.

In the S_N2 reaction, the addition of the nucleophile and the elimination of the leaving group take place simultaneously. S_N2 occurs when the central carbon atom is easily accessible to the nucleophile. Since this reaction occurs in one step, steric effects drive the reaction speed. By contrast, the S_N1 reaction involves two steps. S_N1 reactions tend to be important when the central carbon atom of the substrate is surrounded by bulky groups, both because such groups interfere sterically with the S_N2 reaction and because a highly substituted carbon forms a stable carbocation.

- (a) Define the term enantiomers. 1
 (b) Analyse the given graph and determine whether the reaction follows S_N1 or S_N2 mechanism. 1



- (c) Give reasons for the following statements. 2
 (i) S_N2 reactions involve inversion of configuration.
 (ii) A racemic mixture has zero optical rotation.

OR

- (c) Which among the following undergoes S_N1 reaction faster? 2
 (i) $C_6H_5CH_2Br$ or $C_6H_5C(CH_3)(C_6H_5)Br$
 (ii) CH_3Cl or $(CH_3)_3CCl$

- 30 Ethanol is an important member of the alcohol family and has numerous industrial, laboratory, and household applications. It can be produced through the fermentation of sugars present in substances such as sugarcane juice, molasses, and fruits. During this process, enzymes present in yeast convert glucose into ethanol and carbon dioxide. The ethanol produced by fermentation is commonly used in the preparation of alcoholic beverages such as wine. Alcohols also undergo dehydration reactions to form alkenes under suitable conditions. Owing to their diverse chemical properties, alcohols have a wide range of applications. They are used in the preparation of medicines and pharmaceuticals, esters, fuels, solvents, perfumes, and disinfectants, making them important compounds in both everyday life and industry.

- (a) Methanal on reaction with CH_3MgBr followed by hydrolysis forms A. A on reaction with conc. H_2SO_4 at 443 K forms B. However, A on reaction with conc. H_2SO_4 at 413 K, a product C is obtained. Identify A, B, C and write the IUPAC name of product C. 2
 (b) How is aspirin prepared? 1
 (c) (i) What is known as denaturation of alcohol? 1

OR

- (c) (ii) Arrange the following in increasing order of the property mentioned. 1
 Propan-2-ol, 2-Methylpropan-2-ol, Ethanol (Ease of dehydration)

SECTION E

31(a) Explain with the help of a chemical reaction:

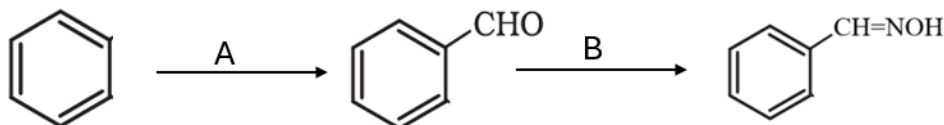
5×1=5

- (i) Acetone is treated with Semicarbazide.
- (ii) Two molecules of methanal are treated with conc. NaOH.
- (iii) Butan-2-one is treated with Zn/Hg and conc. HCl.
- (iv) Ethanal is treated with two molecules of methanol in the presence of dry hydrogen chloride.
- (v) Phthalic acid is treated with NH₃ followed by strong heating.

OR

(b) Complete the following reactions.

5×1=5

- (i) $\text{CH}_3\text{CN} \xrightarrow{\text{A}} \text{CH}_3\text{CH}=\text{NH} \xrightarrow{\text{B}} \text{CH}_3\text{CHO}$
- (ii) $\text{CH}_3\text{COOH} \xrightarrow{\text{NaOH}} \text{A} \xrightarrow{\text{NaOH/CaO, heat}} \text{B}$
- (iii) $\text{CH}_3\text{COCH}_3 \xrightarrow{\text{NaBH}_4} \text{A} \xrightarrow{\text{B}} \text{CH}_3\text{CH}=\text{CH}_2$
- (iv) $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{CrO}_3} \text{A} \xrightarrow{\text{Dil NaOH}} \text{B}$
- (v) 

32(a)

- (i) What type of deviation from Raoult's law is expected when phenol and aniline are mixed? Give a reason for the deviation. What changes in the net volume of the mixture and enthalpy are expected? 3
- (ii) The vapour pressures of pure liquids A and B are 450 and 700 mm Hg, respectively, at 350 K. Find out the composition of the liquid mixture if the total vapour pressure is 600 mm Hg. 2

OR

- (b)
 - (i) A 1% solution of solute 'X' is isotonic with a 6% solution of sucrose (molar mass = 342 g mol⁻¹). Calculate the molar mass of the solute. 2
 - (ii) A mixture of ethanol and water at a particular composition forms a minimum-boiling azeotropic mixture. Explain. 1
 - (iii) Two gases A and B have the following Henry's law constants at the same temperature:
 K_H of gas A = 3.0×10³ atm
 K_H of gas B = 8.0×10⁴ atm
 Both gases are subjected to the same pressure.
 (a) Which gas will dissolve more readily in water?
 (b) If the temperature is increased, which gas will dissolve more? 2

33(a)

- (i) The resistance of 0.05 M CH_3COOH solution is found to be $100\ \Omega$. If the cell constant is $0.0354\ \text{cm}^{-1}$, calculate the molar conductivity of the acetic acid solution. 3

- (ii) Give reasons for the following statements: 2

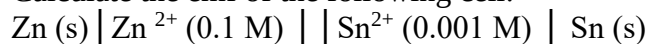
- (a) A mercury cell delivers a constant potential during its lifetime.
(b) In the experimental determination of electrolytic conductance, Direct Current (DC) is not used.

OR

(b)

(i)

Calculate the emf of the following cell: 3



Given: $E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76\ \text{V}$, $E^\circ_{\text{Sn}^{2+}/\text{Sn}} = -0.14\ \text{V}$

$\log 10 = 1$

- (ii) A solution of $\text{Ni}(\text{NO}_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode? 2

(Atomic mass of Ni – 58.7 u)

($1F = 96500\ \text{C mol}^{-1}$)

All the Best