



INDIAN SCHOOL AL WADI AL KABIR

FIRST ASSESSMENT (2023 - 24)

Class: XII
Date: 24.09.2023

Sub: CHEMISTRY (043)
Set - II

Max Marks: 70
Time : 3 hours

General Instructions

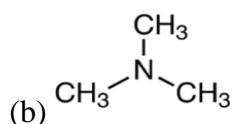
- There are 33 questions in this question paper with internal choice.
- Section A consists of 16 multiple choice questions carrying 1 mark each.
- Section B consists of 5 short answer questions carrying 2 marks each.
- Section C consists of 7 short answer questions carrying 3 marks each.
- Section D consists of 2 case-based questions carrying 4 marks each.
- Section E consists of 3 long answer type questions carrying 5 marks.
- All questions are compulsory.
- Use of calculators and log tables is not allowed.

SECTION A

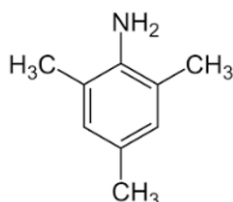
The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

- Which among the following has higher boiling point?
 - 1-Bromobutane
 - 2-Bromobutane
 - 1-Bromo-2-methylpropane
 - 2-Bromo-2-methylpropane
- For the conversion of Propene to Propan-1-ol, which of the following reagents and conditions are used?
 - Con. H_2SO_4 , water and heat
 - B_2H_6 , H_2O_2 , H_2O , OH^-
 - Dilute H_2SO_4
 - $\text{H}_2\text{O}/\text{H}^+$
- Which of the following reagents can be used to convert CH_3COCl into acetone?
 - $(\text{CH}_3)_2\text{Cd}$
 - CH_3MgBr
 - CH_3Cl
 - $(\text{CH}_3\text{O})_2\text{Mg}$
- Benzene diazonium chloride on reaction with ethanol forms _____
 - Phenol
 - Benzene
 - Toluene
 - Chlorobenzene
- Deficiency of Vitamin A causes _____
 - Beri beri
 - Cheilosis
 - Xerophthalmia
 - Scurvy

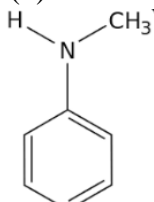
6. An azeotropic mixture of two liquids has a boiling point higher than either of the two liquids when it
- shows large negative deviation from Raoult's law.
 - shows no deviation from Raoult's law
 - shows large positive deviation from Raoult's law.
 - obeys Raoult's law.
7. Which of the following is not correct?
- Allyl halides show high reactivity towards S_N1 reaction.
 - A racemic mixture has zero optical rotation.
 - The electrophilic substitution reactions in haloarenes occur slowly and require more drastic conditions as compared to those in benzene.
 - The carbon-magnesium bond in Grignard reagent is ionic.
8. The products obtained when $(CH_3)_3C-O-CH_3$ reacts with HI are
- $(CH_3)_2C=CH_2$ and CH_3OH
 - $(CH_3)_3C-OH$ and CH_3I
 - $(CH_3)_3C-I$ and CH_3OH
 - $(CH_3)_2C=CH_2$ and CH_3I
9. A compound with molecular formula $C_5H_{10}O$, forms a phenyl hydrazone and gives negative Tollen's test and negative iodoform tests. The compound on reduction gives n-pentane. The compound is
- Pentan-2-one
 - Pentanal
 - Pentanol
 - Pentan-3-one
10. Which among the following amines can be prepared by Gabriel Phthalimide synthesis?



(c)

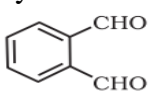


(d)



11. Which of the following pairs will not form an ideal solution?

- Benzene and Toluene
- Nitric acid and Water
- Hexane and Heptane
- Ethyl chloride and Ethyl bromide

12. The IUPAC name of  is

- Benzene-2-al
- Benzene-1,2-al
- Benzene-1.2-dicarbaldehyde
- 2-Oxobenzaldehyde

Questions 13 to 16 are Assertion Reason type. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).
- Assertion (A) is true, but Reason (R) is false.
- Assertion (A) is false, but Reason (R) is true.

13. Assertion (A): Ethanal is more reactive than Propanone towards nucleophilic addition reaction.
Reason (R): Two alkyl groups in propanone reduce the electrophilicity of the carbonyl carbon and offer steric repulsion.
14. Assertion (A): Only a small amount of HCl is required in the reduction of nitro compounds with iron scrap and HCl.
Reason (R): FeCl₂ formed gets hydrolysed to release HCl during the reaction.
15. Assertion (A): Albumin is a globular protein.
Reason (R): Polypeptides coil around to give a straight chain.
16. Assertion (A): The cell placed in a hypertonic solution will swell.
Reason (R) : Hypertonic solutions are those in which the salt concentration is more than 0.9%.

SECTION B

This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. Give reasons for the following.
(a) Phosgene is stored in closed dark coloured bottles.
(b) Aryl halides are extremely less reactive towards nucleophilic substitution reactions.
18. Explain the following with suitable reactions
(a) Kolbe's reaction
(b) Preparation of Aspirin
19. Write the structures and IUPAC names of the products obtained from the following reactions.
(a) Reaction of toluene with KMnO₄-KOH, heat followed by hydrolysis.
(b) Reaction of ethanal with dil NaOH followed by heat.
20. (a) Arrange the following in the increasing order of basic character.
C₆H₅NH₂, C₂H₅NH₂, (C₂H₅)₂NH, NH₃
(b) Although amino group is o- and p- directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline. Give reason.
21. (a) Write the products of hydrolysis of Lactose.
(b) Name the forces that stabilise the 2° and 3° structure of proteins.

OR

Define the following with an example of each.

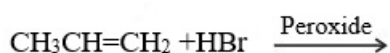
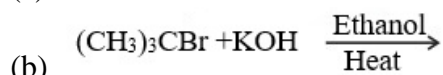
- (a) Polysaccharides
(b) Essential amino acids

SECTION C

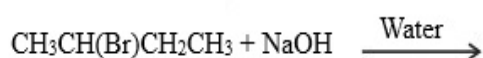
This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. Predict the major product.

(a)



(c)



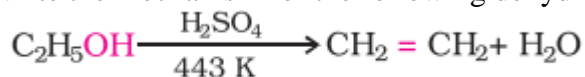
OR

What happens when (write equations)

- (a) Chlorobenzene reacts with chloromethane and Na in presence of dry ether.

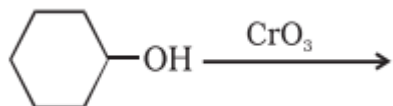
- (b) Bromomethane is heated with AgF.
 (c) Ethene is treated with Br₂ in CCl₄.

23. Write the mechanism for the following dehydration reaction.

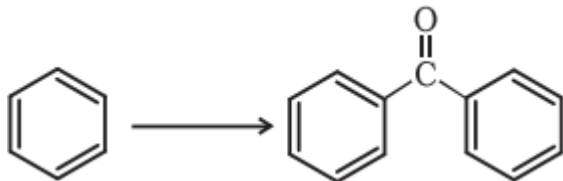


24. Complete each synthesis by giving missing starting material, reagent or products.

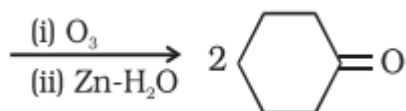
(a)



(b)



(c)

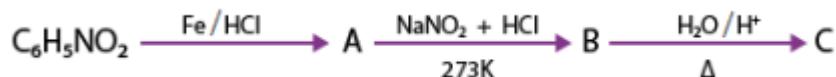


25. Write the structures of A, B and C in the following reactions.

(a)



(b)



26. Write chemical reactions to show that open structure of D-glucose contains the following.

- (a) Straight chain
 (b) Five alcohol groups
 (c) Aldehyde as carbonyl group

27. (a) Define the term Cryoscopic constant.

- (b) Calculate the freezing point of a solution containing 60 g of Glucose (Molar mass = 180g mol⁻¹) in 250g of water. K_f of water is 1.86 K kg mol⁻¹

28. Choose the correct answer from the following pairs.

- (a) (CH₃)₃CBr or CH₃Br (more reactive towards S_N2 mechanism)
 (b) CH₃CH₂CH₂CH₂Cl or CH₃CH(Cl)CH₂CH₃ (Chiral compound)
 (c) CH₃CN or CH₃NC (when CH₃Br reacts with KCN)

SECTION D

The following questions are case -based questions. Each question has an internal choice and carries 4 (1+1+2) marks. Read the passage carefully and answer the questions that follow.

29. In wine making, grapes are the source of sugars and yeast. As grapes ripen, the quantity of sugar increases and yeast grows on the outer skin. When grapes are crushed, sugar and the enzyme come in contact and fermentation starts.

The sugar in grapes is converted to glucose and fructose, in the presence of an enzyme, invertase. Glucose and fructose undergo fermentation in the presence of another enzyme, zymase, which is found in yeast. Fermentation takes place in anaerobic conditions i.e. in absence of air. Carbon dioxide is released during fermentation.

The action of zymase is inhibited once the percentage of alcohol formed exceeds 14 percent. If air gets into fermentation mixture, the oxygen of air oxidises alcohol to carboxylic acids which in turn destroys the taste of alcoholic drinks.

(a) Which compound is also called as wood spirit?

OR

(a) Lower molecular mass alcohols are soluble in water. Give reason.

(b) How is the commercial alcohol made unfit for drinking?

(c) i. Give the name of a chemical reagent used for converting primary alcohol to carboxylic acids.

ii. Give any two uses of the alcohol mentioned in the above paragraph.

30. DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA. Most DNA is located in the cell nucleus (where it is called nuclear DNA). The information in DNA is stored as a code made up of four chemical bases.

The order, or sequence, of these bases determines the information available for building and maintaining an organism, similar to the way in which letters of the alphabet appear in a certain order to form words and sentences.

Each base is also attached to a sugar molecule and a phosphate molecule. Together, a base, sugar, and phosphate is called a nucleotide. Nucleotides are arranged in two long strands that form a spiral called a double helix. The structure of the double helix is somewhat like a ladder, with the base pairs forming the ladder's rungs and the sugar and phosphate molecules forming the vertical sidepieces of the ladder.

(a) The two strands in DNA are complementary to each other. Explain.

(b) Name the linkage between two nucleotides.

(c) Differentiate between DNA and RNA

OR

(c) Write two functions of nucleic acids.

SECTION E

The following questions are long answer type and carry 5 marks each. All questions have an internal choice.

31. Attempt any five of the following.

(a) The order of boiling points of isomeric amines is Primary > Secondary > Tertiary. Explain.

(b) Name a reagent that can be used to distinguish between secondary and tertiary amines.

- (c) What is coupling reaction?
 (d) Convert Hexanenitrile into 1-Aminopentane
 (e) Write the structures of any two isomers of C_3H_9N .
 (f) Write chemical equations for the reaction of ethanolic NH_3 with two moles of C_2H_5Cl .
 (g) Diazonium salts of aromatic amines are more stable than those of aliphatic amines. Give reason.

32. (a) Give a suitable chemical test to distinguish between Propanoic acid and Phenol.
 (b) Aromatic carboxylic acids do not undergo Friedel Crafts reaction. Give reason.
 (c) Convert the following.
 (i) Propanone to propane
 (ii) Benzene to benzaldehyde
 (iii) Ethanenitrile to Ethanal

OR

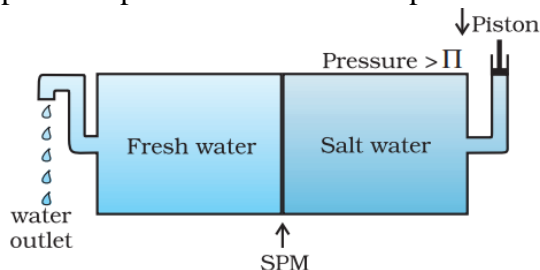
- (a) Give the structure of Cyclopropanone oxime
 (b) Carboxylic carbon is less electrophilic than carbonyl carbon of aldehydes and ketones. Give reason.
 (c) Among the given compounds, Methanal, Pentanal and Butanol, choose the one which will undergo
 (i) Aldol condensation
 (ii) Cannizzaro reaction
 (iii) Neither aldol nor Cannizzaro reaction

33. (a) What is the effect of pressure on solubility of solids in liquids?
 (b) What type of deviation from Raoult's law is shown by a mixture of ethanol and acetone. Give reason

- (c) Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea (NH_2CONH_2) is dissolved in 850 g of water. Calculate the vapour pressure of water for this solution.
 (At mass of N=14 u, O=16 u, H=1u)

OR

- (a) Ethylene glycol water mixture is used in car radiators in cold countries. Give reason.
 (b) Explain the phenomenon that is depicted in the picture below. Write an application of this phenomenon.

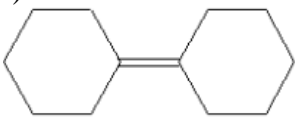


- (c) What will be the concentration of sucrose solution which develops an osmotic pressure of 2 atm at $27^\circ C$?
 ($R = 0.0821 \text{ atm L K}^{-1} \text{ mol}^{-1}$)

ANSWER KEY

CLASS XII CHEMISTRY

1	(a) 1-Bromobutane	1
2	(b) B_2H_6 , H_2O_2 , H_2O , OH^-	1
3	(a) $(CH_3)_2Cd$	1
4	(b) Benzene	1

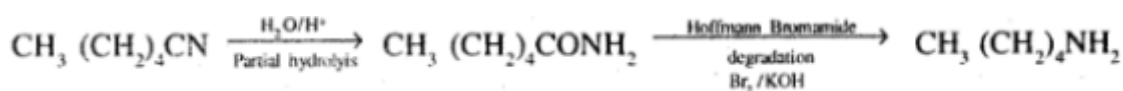
	(c) 	1
25	(a) A- CH_3CONH_2 B- CH_3NH_2 C- CH_3OH (b) A- $\text{C}_6\text{H}_5\text{NH}_2$ B- $\text{C}_6\text{H}_5\text{-N}_2^+\text{Cl}^-$ C- $\text{C}_6\text{H}_5\text{OH}$	$\frac{1}{2} \times 3$ $\frac{1}{2} \times 3$
26	(a) $\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{HI}, \Delta} \text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_3$ (<i>n</i> -Hexane) (b) $\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{Acetic anhydride}} \begin{array}{c} \text{CHO} \quad \text{O} \\ \quad \parallel \\ (\text{CH-O-C-CH}_3)_4 \\ \quad \parallel \\ \text{CH}_2\text{-O-C-CH}_3 \end{array}$ (c) $\begin{array}{c} \text{CHO} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array} \xrightarrow{\text{Br}_2 \text{ water}} \begin{array}{c} \text{COOH} \\ \\ (\text{CHOH})_4 \\ \\ \text{CH}_2\text{OH} \end{array}$ Gluconic acid	1 1 1
27	(a) It is the depression in freezing point of a 1 molal solution. Unit Kkgmol^{-1} (b) $\Delta T_f = 1.86 \times 60 \times 1000/180 \times 250$ $= 2.48 \text{ K}$ $\Delta T_f = T_f^\circ - T_f$ $T_f = 273.15 - 2.48$ $= 270.67 \text{ K}$	1 1 1
28	(a) CH_3Br (b) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{CH}_3$ (c) CH_3CN	1 1 1
29	(a) CH_3OH OR (a) H -bonds (b) The commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it a colour) and pyridine (a foul-smelling liquid). It is known as denaturation of alcohol (c) i. acidified/alkaline/neutral KMnO_4 or any other strong oxidising agent. ii. any two uses	1 1 1 $\frac{1}{2} \times 2$
30	(a) In the helical structure of DNA, the two strands are held together by hydrogen bonds between specific pairs of bases. Cytosine forms H bonds with guanine and Adenine forms two H bonds with Thymine. (b) Phosphodiester linkage (c)	1 1 $\frac{1}{2} \times 4$

DNA	RNA
Sugar- β -D-2-Deoxyribose	Sugar- β -D-ribose
Bases- adenine (A), guanine (G), cytosine (C) and thymine (T).	Bases- adenine (A), guanine (G), cytosine (C) and uracil (U).
Double stranded	Single stranded. May fold back to become double stranded.

OR

- (c) i. DNA is exclusively responsible for maintaining the identity of different species of organisms
 ii. protein synthesis in the cell

- 31 (a) Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one and hydrogen of another molecule. This intermolecular association is more in primary amines than in secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it. Tertiary amines do not have intermolecular association due to the absence of hydrogen atom available for hydrogen bond formation.
 (b) Hinsberg reagent, $C_6H_5SO_2Cl$
 (c) Benzene diazonium chloride reacts with phenol in which the phenol molecule at its para position is coupled with the diazonium salt to form p-hydroxyazobenzene. This type of reaction is known as coupling reaction.
 (d)

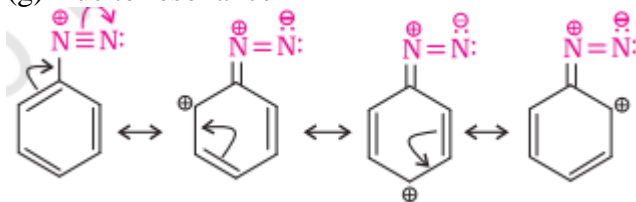


- (e) Any two isomers.

(f)

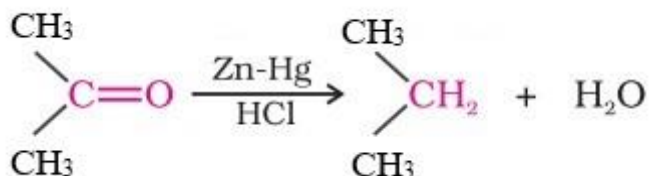


- (g) Due to resonance

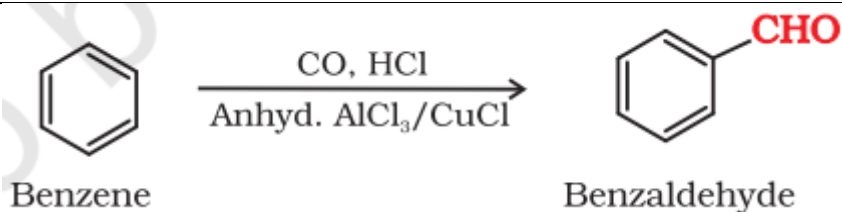


- 32 (a) Carboxylic acids- $NaHCO_3$ -brisk effervescence of CO_2 or Phenol- violet colouration with neutral $FeCl_3$
 (b) The carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group.

- (c)
 (i)



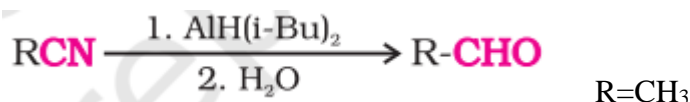
(ii)



(iii)

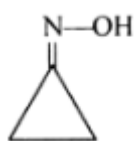


OR

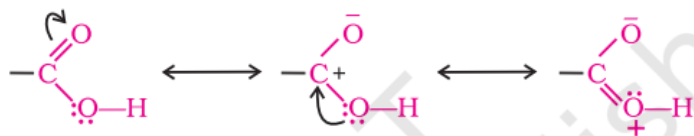


OR

(a)



(b) The carboxylic carbon is less electrophilic than carbonyl carbon because of the possible resonance structure.



(c)

(i) Aldol condensation – Pentanal

(ii) Cannizzaro reaction- Methanal

(iii) Neither aldol nor Cannizzaro reaction- Butanol

33

(a) No effect

(b) Positive deviation

In pure ethanol, molecules are hydrogen bonded. On adding acetone, its molecules get in between the host molecules and break some of the hydrogen bonds between them. Due to weakening of interactions, the solution shows positive deviation from Raoult's Law.

(c)

$$\frac{p_1^0 - p_1}{p_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$$

$$= \frac{50 \times 18}{850 \times 60}$$

$$= 0.01765$$

$$p_1^0 - p_1 = 23.8 (0.01765)$$

$$= 0.42$$

$$p_1 = 23.38 \text{ mm Hg}$$

OR

(a) To lower the freezing point of water.

(b) The direction of osmosis can be reversed if a pressure larger than the osmotic pressure

	<p>is applied to the solution side. The pure solvent flows out of the solution through the semi permeable membrane. This phenomenon is called reverse osmosis. Desalination of sea water.</p> <p>(c) $\pi = CRT$</p> <p>$2 \text{ atm} = C \times 0.082 \text{ atm L K}^{-1}\text{mol}^{-1} \times 300 \text{ K}$</p> <p>$C = 0.081 \text{ mol L}^{-1}$</p>	<p>1</p> <p>1</p> <p>1</p>
--	--	----------------------------