BUDHA DAL PUBLIC SCHOOL, PATIALA
Second Term Examination (23 December 2023)
Class XII (Science)
Subject - Chemistry
(Set - A)

Time: 3hrs. M.M. 70

General Instructions:

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

Section - A

Q1. Which of the following is not correct?

a) In haloarenes, the electron pairs on halogen atom are in conjugation with π-electrons of the ring.

b) The carbon-magnesium bond is covalent and non-polar in nature.

c) During S_N1 reaction, the carbocation formed in the slow step being sp^2 hybridised is planar.

d) Out of $CH_2=CH-Cl$ and $C_6H_5CH_2Cl$, $C_6H_5CH_2Cl$ is more reactive towards S_N1 reaction.

Q2. Which is the correct IUPAC name for $CH_3 - \underset{\underset{C_2H_5}{|}}{CH} - CH_2 - Br$?

a) 1-Bromo-2-ethylpropane b) 1-Bromo-2-ethyl-2methylethane

c) 1-Bromo-2-methylbutane d) 2-Methyl-1-bromobutane

Q3. Which of the following observation is shown by 2-phynyl ethanol with Lucas Reagent?

a) Turbidity will be observed within five miuntes

b) No turbidity will be observed

c) Turbidity will be observed immediately

d) Turbidity will be observed at room temperature but will disappear after five miuntes

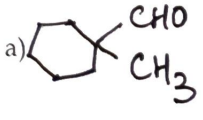
Q4. Which of the following alcohols will not undergo oxidation?

a) Butanol b) Butan-2-ol c) 2-Methylbutan-2-ol d) 3-Methylbutan-2-ol

Q5. Which of the following compounds will give butanone on oxidation with alkaline $KMnO_4$ solution?

a) Butan-1-ol b) Butan-2-ol c) both of these d) None of these

Q6. Cannizzaro's reaction is not given by _____.

a) 

b)  CHO c) HCHO d) CH_3CHO

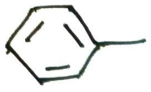
A-1

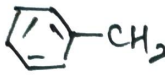
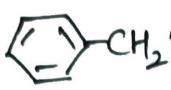
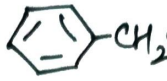
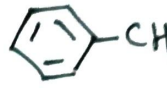
The correct IUPAC name for $CH_2=CHCH_2NHCH_3$ is

a) Allylmethylamine b) 2-amino-4-pentene c) 4-aminopent-1-ene d) N-methylprop-2-en-1-amine

Q8. **Out of the following, the strongest base in aqueous solution is**

a) Methylamine b) Dimethylamine c) Trimethylamine d) Aniline

Q9.  $CH_2 - NH_2$ on heating with $CHCl_3$ and alcoholic KOH gives foul smell of

(a)  (b)  (c)  (d) 

Q10. **Nucleosides are compound of**

a) a pentose sugar and dphosphoric acid

b) a nitrogenous base and phosphoric acid

c) a nitrogenous base and a pentose sugar

d) a nitrogenous base, a pentose sugar and phosphoric acid

Q11. **The vitamins which can be stored in our body are :**

a) Vitamin A, B, D and E b) Vitamin A, C, D and K

c) Vitamin A, B, C and D d) Vitamin A, D, E and K

Q12. **Which of the following statements is not true about glucose?**

a) It is an aldohexose b) on heating with HI it forms n-hexane

c) It is present in pyranose form d) it gives 2, 4 DNP test

In the following questions, two statements are given – one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to the questions from the codes (a), (b), (c) and (d) as given below:

a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

b) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is not the correct explanation of the Assertion (A).

c) Assertion (A) is correct, but Reason (R) is incorrect statement.

d) Assertion (A) is incorrect, but Reason (R) is correct statement.

Q13. **Assertion (A) :** Aryl halides undergo nucleophilic substitution reactions with ease.

Reason (R) : The carbon halogen bond in aryl halides has partial double bond character.

Q14. **Assertion (A) :** C_2H_5OH is a weaker base than phenol but is a stronger nucleophile than phenol

Reason (R) : In phenol the lone pair of electrons on oxygen is withdrawn towards the ring due to resonance.

Q15. **Assertion (A) :** Reactivity of ketones is more than aldehydes.

Reason (R) : The carbonyl carbon of ketones is less electrophilic as compared to aldehydes.

Q16. **Assertion (A) :** Enzymes are very specific for a particular reaction and for a particular substrate.

Reason (R) : Enzymes are biocatalysts.

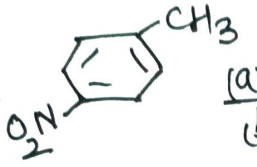
Section – B

Alcohols are comparatively more soluble in water than hydrocarbons of comparable molecular masses. Explain this fact.

Write the structures of products of the following reactions:

(i) $H_3C-C\equiv C-H \xrightarrow{Hg^{2+},\ H_2SO_4} ?$

(ii)



$\xrightarrow[(b)\ H_3O^+]{(a)\ CrO_2Cl_2} ?$

OR

Show how each of the following compounds can be converted to benzoic acid

a) Ethylbenzene b) Bromobenzene

Q19. **Arrange the following compounds in increasing order of their property as indicated:**

a) Acetaldehyde, Acetone, Di-tert-butyl ketone, Methyl tert-butyl ketone (reactivity towards HCN)

b) Benzoic acid, 4-nitrobenzoic acid, 3, 4-dinitrobenzoic acid, 4-methoxy benzoic acid (acid strength)

Q20. **Arrange the following:**

a) In increasing order of basic strength: in aqueous medium.

$C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2

b) In decreasing order of basic strength in gas phase:

$C_2H_5NH_2$, $(C_2H_5)_2$, NH, $(C_2H_5)_3N$ and NH_3

Q21. What are the expected products of hydrolysis of lactose?

Section – C

Q22. **Explain why**

a) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?

b) alkyl halides, though polar, are immiscible with water?

c) Grignard reagents should be prepared under anhydrous conditions

Q23. **Write the structure of the major organic product in each of the following reactions:**

(i) $CH_3CH_2CH_2Cl + NaI \xrightarrow{Acetone,\ \Delta} ?$

(ii) $(CH_3)_3CBr + KOH \xrightarrow{Ethanol,\ \Delta} ?$

(iii) $CH_3CH_2CH=CH_2 + HBr \xrightarrow{Peroxide} ?$

OR

Arrange the compounds of each set in increasing order of reactivity towards S_N2 displacement:

a) 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane.

b) 1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 2-Bromo-3-methylbutane

c) 1-Bromobutane, 1-Bromo-2, 2-dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane

Q24. Write the mechanism of hydration of ethene to form ethanol.

Q25. Write the name of the reaction, structure and IUPAC name of the product formed when :

a) Phenol reacts with $CHCL_3$ in the presence of NaOH followed by hydrolysis.

b) $CH_3CH_2CH(CH_3)CH(CH_3)ONa$ reacts with C_2H_5Br

...ount for the following

a) Although amino group is o- and p-directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline.

b) Aniline does not undergo Friedel-Crafts reaction.

Q27. What happens when D-glucose is treated with the following reagents?

a) HI b) Bromine water c) HNO_3

Q28. Give simple chemical tests to distinguish between the following pairs of compounds:

a) Propanal and Propanone b) Phenol and Benzoic acid c) Pentan-2-one and Pentane-3-one

Section - D

Q29. **Read the passage given below and answer the following questions:**

Aldehydes and ketones having atleast one a-hydrogen undergo a reaction in the presence of dilute alkali as a catalyst to form ß-hydroxy aldehyde (aldol) or ß-hydroxy ketones (ketol), respectively. The aldol and ketol readily lose water to give a, ß-unsaturated carbonyl compounds which are aldol condensation products and the reaction is called aldol condensation. When aldol condensation is carried out between two different aldehydes and/or ketones, it is called cross aldol condensation.

a) Give the IUPAC name of the compound formed when acetone undergoes self aldol condensation.
b) Identify the compounds that give 1, 3-diphenylprop-2-en-1-one after aldol condensation?
c) Give the reaction that gives of formation of products by self aldol condensation of acetone.

OR

Write the equation of cross aldol condensation between formaldehyde and acetaldehyde.

Q30 **Read the following passage and answer the questions that follow:**

Living systems are made up of various complex biomolecule, like carbohydrates, proteins, nucleic acids, lipids, etc. Carbohydrates are optically active polyhydroxy aldehydes or ketones or molecules which provide such units on hydrolysis. They are broadly classified into three groups - monosaccharides, oligosaccharides and polysaccharides. Monosaccharides are held together by glycosidic linkages to form disaccharides like sucrose, maltose or polysaccharides like starch and cellulose.

Another biomolecule: proteins are polymers of a-amino acids which are linked by peptide bonds. Ten amino acids are called essential amino acids. Structure and shape of proteins can be studied at four different levels i... primary, secondary, tertiary and quaternary, each level being more complex than the previous one.

1. What is the difference between a glycosidic linkage and peptide linkage?
2. Which amino acids are called essential amino acids?
3. What are the common types of secondary structures of proteins? Write any two forces which-stabilise the secondary and tertiary structures of protein.

OR

Define denaturation of protein with an example. During denaturation which structures of protein lose their biological activity?

Q31. a) Write equations for the following named reactions :

i) Sandmayer Reaction ii) Wurtz Reaction iii) Finkelstein Reaction

b) Write the structure of the following compounds :

i) 1-Chloro-4-ethylcyclohexane ii) 1-Bromo-4-sec-butyl-2-methylbenzene

OR

a) What are ambident nucleophiles? Explain with an example.

b) p-Dichlorobenzene has higher m.p. than those of o- and m-isomers. Discuss.

c) Give reason

C - Cl bond length in chlorobenzene is shorter than C - Cl bond length in $CH_3 - Cl$.

Q32. a) Give equations of the following reactions:

i) Oxidation of propane-1-ol with alkaline $KMnO_4$ solution.

ii) Bromine in CS_2 with phenol.

iii) Williamson Ether Synthesis

b) Arrange : Water, ethanol and phenol in 'increasing order of acidity and give reason for your answer.

Q33. An organic compound with molecular formula $C_7H_7NO_2$ exists in three isomeric forms, the isomer 'A' has the highest melting point of the three. 'A' on reduction gives compound 'B' with molecular formula C_7H_9N. 'B' on treatment with $NaNO_2/HCl$ at 0-5 °C to form compound "C". On treating C with H_3PO_2 it gets converted to D with formula C_7H_8, which on further reaction with CrO_2Cl_2 followed by hydrolysis forms 'E' C_7H_6O. Write the structure of compounds A to E. Write the chemical equations involved.

OR

(a) Account for the following:

(i) N-ethylbenzenesulphonyl amide is soluble in alkali.

(ii) Reduction of nitrobenzene using Fe and HCl is preferred over Sn and HCl.

(b) Arrange the following in:

(i) decreasing order of pk_b values : $C_6H_5NH_2$, $C_6H_5NHCH_3$, $C_6H_5CH_2NH_2$, CH_3NH_2, NH_3

(ii) increasing order of solubility in water : C_2H_5C1, $C_2H_5NH_2$, C_2H_5OH

(iii) decreasing boiling point : CH_3COOH, C_2H_5OH, CH_3NH_2, $CH_3\ OCH_3$