

KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Marks Scored:

Level : B.Pharm.

Year : II

Exam Roll No. :

Registration No.:

22 JAN 2024

Time: 30 mins.

Course : CHEM 203

Semester : I

F. M. : 20

Date :

SECTION "A"

[20Q. × 1 = 20 marks]

Choose the most appropriate answer and mark [X] in the box.

- Which of the following statement is **CORRECT**?
 - The Ruff procedure lengthens an aldose chain and gives a single product
 - The Ruff procedure shortens an aldose chain and gives two epimers
 - The Kiliani-Fischer procedure shortens an aldose chain and gives a single product
 - The Kiliani-Fischer procedure lengthens an aldose chain and gives two epimers
- Methylated amylopectin upon hydrolysis yields _____ as the highest percentage product.
 - Mono-*O*-methyl D glucose
 - Di-*O*-methyl D glucose
 - Tri-*O*-methylated D glucose
 - Tetra-*O*-methyl D glucose
- Select the following sugars that are epimeric in nature.

$$\begin{array}{c} \text{CHO} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

A

$$\begin{array}{c} \text{CHO} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

B

$$\begin{array}{c} \text{CHO} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

C

$$\begin{array}{c} \text{CHO} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

D

$$\begin{array}{c} \text{CHO} \\ | \\ \text{H} - \text{C} - \text{OH} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

E

 - A & C; B & D
 - A & B; C & D
 - C & E; B & D
 - A & D; B & C
- Select the one that does not match regarding base promoted halogenation of ketones.
 - Rate of the reaction depends upon the concentration of ketone and base
 - The second step in the mechanism is slow and rate determining step
 - Kinetics helps to draw the reaction mechanism
 - Carbanion is stabilized by the presence of C=O group
- When the Boc protecting group is deprotected, _____ forms as one of the products.
 - $(\text{CH}_3)_2=\text{CH}_2$
 - $\text{C}_6\text{H}_5\text{CH}_3$
 - $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$
 - Dicyclohexylcarbodiimide (DCC)
- Which of the following statements are **CORRECT**?
 - [1, 5] Sigmatropic migration of carbon occurs with retention of configuration
 - For $4n$ π electrons in electrocyclic reaction, photochemical condition leads to conrotatory motion
 - For $4n+2$ π electrons in electrocyclic reaction, thermal condition leads to disrotatory motion
 - For $4n$ total π electrons in cycloadditions reaction; supra, antarafacial process is applicable in photochemical condition
 - a,c
 - a,d
 - b,c
 - b,d

7. The reaction of pyridine with organolithium is an example of
 Electrophilic substitution Electrophilic addition
 Nucleophilic substitution Nucleophilic addition
8. Nylon is made from
 Urea and formaldehyde
 Adipic acid and hexamethylene diamine
 Phthalic anhydride and methyl terephthalate
 Glycerol and phthalic anhydride
9. The reaction of $\text{CH}_3\text{COOC}_2\text{H}_5$ in presence of $\text{C}_2\text{H}_5\text{OH}/\text{NaOH}$ gives
 β Keto ester Monosubstituted acetic acid
 Monosubstituted ketone Double bond at α - β carbon
10. _____ is/are not polymeric in nature.
 Proteins Amylose Lipids Cellulose
11. In betaine,
 Oxygen develops negative charge and heteroatom positive
 Oxygen develops positive charge and heteroatom negative
 Carbanion is bound to a positively charged heteroatom
 Carbanion is bound to a negatively charged heteroatom
12. Which of the following statement is wrong in pericyclic reaction?
 [1,9] Sigmatropic migration of H is suprafacial
 [1,3] Sigmatropic migration of H is observed commonly
 Symmetry and geometry should be considered
 For larger Pi frameworks, both supra and antarafacial shifts should be possible
13. Edman reagent is _____ and reacts with _____ functional group in a peptide.
 2,4-Dinitrofluorobenzene; free amino
 2,4-Dinitrofluorobenzene; free carboxylic acid
 Phenyl isothiocyanate; free amino
 Phenyl isothiocyanate; free carboxylic acid
14. Alditol is a derivative from _____
 Monosaccharide Monocarboxylic acid
 Dicarboxylic acid Polyhydroxy alcohol
15. Cellulose is made up of _____
 β 1-4 Linkage between D-glucose units
 β 1-2 Linkage between D-glucose units
 α 1-4 Linkage between D-glucose units
 β 1-4 Linkage between D-glucose units and in some points 1-6 linkage

Fill in the blanks with appropriate words/symbols.

16. Furan on treatment with SO_3 yields _____.
17. The ψ_4 atomic orbitals of 1,3,5-Hexatriene looks like _____.
18. _____ is an example of inhibitor in free radical induced polymerization reaction.
19. Lauryl alcohol reacts with ethylene oxide to give _____ (chemical formula).
20. Alkyne reacts with $\text{NaNH}_2/\text{NH}_3$ to give _____ as organometallic reagent.

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Level : B.Pharm.
Year : II
Time : 2 hrs. 30 mins.

Course : CHEM 203
Semester : I
F. M. : 55

23 JAN 2024

SECTION "B"

Attempt ALL questions.

1. Give the mechanism for the following reactions. [5 × 2 = 10]
- $\text{CH}_3\text{-CO-CH}_2\text{-CO-OC}_2\text{H}_5 + \text{CH}_3\text{Br}$ in presence of $\text{C}_2\text{H}_5\text{OH/NaOH}$
 - Phenol + HCHO in acidic and basic medium
 - Modified malonic ester synthesis
 - [2+2] cycloaddition reaction in a photochemical condition
 - $\text{CH}_3\text{CHO} + \text{Ph}_3\text{P=C-(R}^1\text{)-R}^2$
2. Explain the following statements (ANY FIVE). [5 × 2 = 10]
- In [1, 5] sigmatropic migration of carbon, there is retention of configuration.
 - Electrophilic substitution in pyrrole occurs more readily than in benzene.
 - D (+) Glucose gives positive Tollen's test but negative Schiff text.
 - The linkage between two monomers of (+) lactose is a galactoside.
 - Benzoylation is not the good choice for protection of amino group during peptide synthesis.
 - Quality of a soap depends upon various factors.
3. Give the chemical reactions involved in the following processes (ANY SIX). [6 × 2 = 12]
- Conversion of an aldohexose into its epimer
-
- Diels Alder reaction between
 - $\text{CH}_3\text{-C}\equiv\text{C MgBr} + \text{CH}_3\text{CHO}$ in dry ether
 - Synthesis of malonyl CoA and malonyl S-ACP where ACP is acyl carrier protein
 - Thermal cyclization of *cis,trans*-2,4,-Hexadiene
 - Crossed Claisen condensation
 - Methylation of D (+) glucose followed by HNO_3 oxidation
- 4.
- How do you synthesize $\text{CH}_3\text{-CH}_2\text{-CH(Ph)-COOH}$ using ethyl malonate as the starting material? [2]
 - What is the role of phenyl isothiocyanate in the Edman degradation method? Show with chemical equations and explanations. [2]
 - How can you demonstrate the chemical similarity between soap and phosphoglycerides? [2]
 - Methylation reaction helps to figure out the chemical structure of amylopectin. Justify this statement with suitable chemical equations and explanations. [2]
 - Why does the biochemical activity of α chymotrypsin drops beyond the body pH? [2]
 - Write down chemical reactions of pyridine with focus on electrophilic substitution (one reaction), nucleophilic substitution (one reaction) and as a base (one reaction). Where does electrophilic substitution in pyridine take place and why? [3]

5. Write short notes on (*ANY FOUR*).
- a. Detergents
 - b. Cyclic structure of D (+) glucose
 - c. Free radical based polymerization
 - d. Carbanion
 - e. Cellulose

[2.5 × 4 = 10]