

Roll No.

Total Pages : 6

325103

January 2023

B.Sc. (Life Sciences) Ist SEMESTER

Conceptual Organic Chemistry (BLS 103)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- 1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
- 2. Answer any four questions from Part-B in detail.*
- 3. Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Explain the order of stability of various conformations of cyclohexane. (1.5)
- (b) Classify the following as electrophiles and nucleophiles with explanation : SF_4 , CCl_2 , SO_3 . (1.5)
- (c) Which is more stable and why between 1,3-pentadiene and 1,4-pentadiene? (1.5)
- (d) Arrange and explain the order of nucleophilicity of halide ions in water. (1.5)
- (e) What are the products obtained when 2-chloro-1-phenylpropane undergoes dehydrohalogenation? What is the major product and why? (1.5)

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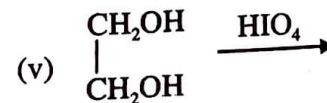
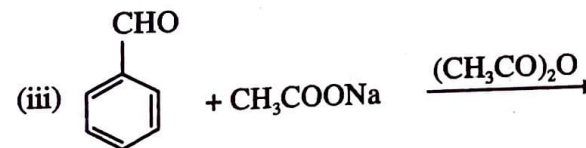
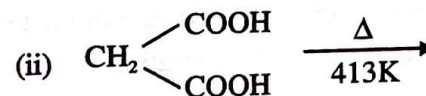
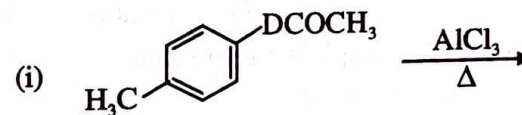
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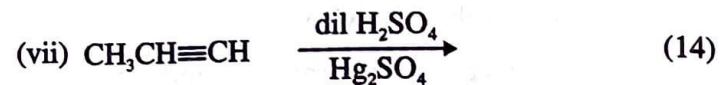
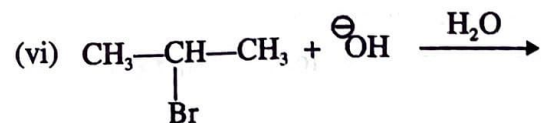
- (f) Why is acylium ion generated in Friedel craft acylation more stable than ordinary carbocations? (1.5)
- (g) In 1,3-butadiene, 1,4 addition occurs slower than 1,2 addition at low temperatures. Explain. (1.5)
- (h) Justify the statement that aryl halides and vinyl halides show low reactivity towards nucleophilic substitution reaction compared to alkyl halides. (1.5)
- (i) Why nitration of toluene is much faster compared to the nitration of nitrobenzene? Name the product formed in each case. (1.5)
- (j) Which one is more reactive towards nucleophilic substitution and why C_6H_5Cl or CH_3CH_2Cl . (1.5)

PART-B

2. (a) Carry out the following conversions :
- Convert secondary alcohol to ketone.
 - Ethanol to ethanal.
 - 1-propyne to 2-Bromopropene.
 - Propanoyl chloride propanal.
 - Benzene to Toluene. (10)
- (b) Explain why alkenes undergo electrophilic addition while benzene undergoes electrophilic substitution reaction. (5)
3. (a) With the help of a mechanism explain Friedel Craft acylation in benzene. (3)

- (b) Discuss the various conformations of 1,2-ethanediol in Newman projection formulae and explain their relative order of stability. (3)
- (c) Explain the following :
- Explain aldehydes and ketones undergo nucleophilic addition reaction.
 - S_N^2 reactions of alkyl halides proceed with complete stereochemical inversion. Explain the mechanism.
 - Why o- and m-chloronitrobenzene undergo faster nucleophilic substitution ? (9)
4. (a) Complete the following reactions :

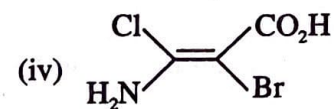
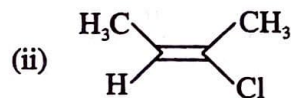




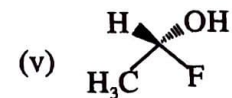
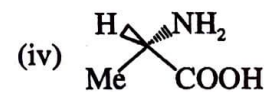
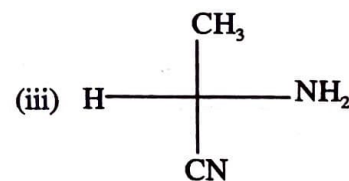
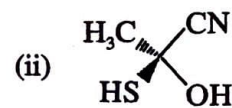
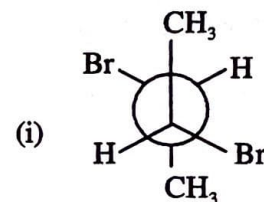
(b) Write down the product(s) obtained on dehydration of 3,3,-dimethylbutan-2-ol. (1)

5. (a) An organic compound A ($\text{C}_{16}\text{H}_{16}$) on ozonolysis gives only one product B ($\text{C}_8\text{H}_8\text{O}$). Compound B on reaction with iodine in presence of sodium hydroxide gives sodium benzoate. B also reacts with hydrazine in presence of KOH to give C (C_8H_{10}). Deduce the structures of A, B, and C. Give equations and reactions involved. Also explain the mechanism of conversion of B to sodium benzoate. (5)

(b) Which of the following compound exhibit geometrical isomerism? Assign *E/Z* configuration to them.



(c) Convert in Fischer and assign R/S configuration. (5)



6. (a) Write short notes on :
- (i) Directive influence of substituents in the benzene.
 - (ii) Saytzeff's rule.
 - (iii) Electrolytic reduction.
 - (iv) Resolution of the racemic mixture by the salt formation method.
 - (v) Specific and molar rotation. (10)
- (b) The rate of addition of HCN to ketones to form cyanohydrin is increased by the addition of a trace amount of NaCN. Explain with a mechanism. (5)

7. Explain with mechanism following reactions :

- (a) Iodoform reaction.
 - (b) Aldol condensation.
 - (c) Clemmensen reduction.
 - (d) Hydroboration-oxidation.
 - (e) Oppenauer oxidation. (15)
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