

Reg. No. : .....

Name : .....

Third Semester M.Sc. Degree Examination, February 2021

Chemistry/Polymer Chemistry

CH/CL/CA/CM/PC 232 – ORGANIC CHEMISTRY – III

Common for Chemistry (2016 Admission Onwards) and

Polymer Chemistry (2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

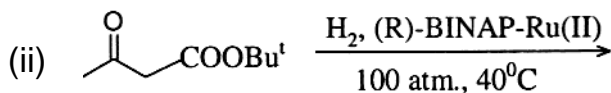
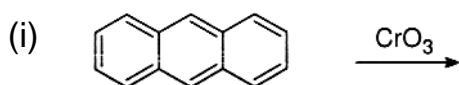
Answer any **two** among (a), (b) and (c) from each questions. Each sub question carries **2** marks.

1. (a) Determine the structure of the compound. Molecular formula  $C_3H_6O$ ,  $\lambda_{max} = 292 \text{ nm}$  and  $\epsilon_{max} = 21$ ; IR (1)  $2720 \text{ cm}^{-1}(\text{w})$  and (2)  $1738 \text{ cm}^{-1}(\text{s})$ .
- (b) A nitrogen containing aromatic compound shows bands at  $1550$  and  $1350 \text{ cm}^{-1}$ . Identify the functional group present in it.
- (c) Indicate which absorption bands in the IR spectrum can be used to distinguish between the following pairs of compounds :
  - (i)  $(CH_2)_3N$  and  $(CH_3)_2CHNH_2$ ,
  - (ii)  $CH_3CH_2OH$  and  $CH_3CO_2H$

P.T.O.



2. (a) Explain the advantages of TOF mass analysers?
- (b) What do you mean by DEPT?
- (c) Give the splitting pattern in the  $^1\text{H}$  NMR spectrum of  $\text{CH}_2=\text{CHBr}$ .
3. (a) What are the different factors affecting the rate of Chichibabin reaction.
- (b) Predict the products of the following reactions :



- (c) What are the advantages of osmium tetroxide compared to  $\text{KMnO}_4$  in hydroxylation of alkenes? What are the disadvantages?
4. (a) What is chiral pool synthesis?
- (b) Describe Kolbe oxidation
- (c) What are synthons? How is it related with synthetic equivalents?
5. (a) What is the principle of column chromatography?
- (b) Describe the application of paper chromatography in identifying different  $\alpha$ -amino acids.
- (c) What is capillary electrophoresis?



## SECTION – B

Answer (a) or (b) of each question and each question carries **5** marks.

6. (a) Discuss briefly about Nuclear Overhauser Effect (NOE)?  
(b) Explain nitrogen rule. Explain how it is useful in determining the molecular formula.
7. (a) What is olefin metathesis? Discuss the synthetic applications.  
(b) Discuss the mechanism and applications of Mitsunobu reaction.
8. (a) Explain with examples :  
(i) Shapiro reaction and  
(ii) Ritter reaction.  
(b) Discuss Wolf-Kishner reduction and Oppenauer oxidation.
9. (a) Explain the principle of gas chromatography. What type of substrates are analysed using GC?  
(b) Discuss the principle and applications of solvent extraction.
10. (a) Discuss about Electrospray and MALDI ion sources in mass spectrometry.  
(b) Identify the structure of the compound using following spectral details :
- MF :  $C_8H_{10}O_2$
- IR Bands : 3000, 2951, 2936, 1509, 1464, 1233, 1060, 827  $cm^{-1}$
- $^1H$  NMR :  $\delta$  3.75s, 6H,  $\delta$  6.83, s, 4 H
- $^{13}C$  NMR : (off resonance splitting in paranthesis) 56(q), 114(d) and 153 (s) ppm
- EIM MS : 138 (Base peak) 123, 95, 41



## SECTION – C

Answer any **three** questions and each question carries **10** marks.

11. Discuss the characteristic group frequencies in IR spectroscopy. How will you distinguish intermolecular and interamolecular hydrogen bonding using IR spectroscopy?
  12. Discuss the anisotropic effects in NMR spectroscopy. Discuss the spin-spin interactions in NMR spectroscopy.
  13. Write notes on the metal mediated C-C coupling reactions with special reference to
    - (a) Stille reaction
    - (b) Suzuki coupling
    - (c) Sonagashira coupling.
  14. Discuss the basic principles of retro synthetic analysis. Explain one group and two group C - C disconnections.
  15. With a schematic diagram explain the principle, instrumentation and applications of HPLC.
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