



Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, January 2014
(2009 Admission)
(Branch III – Chemistry/Branch IV – Analytical Chemistry/
Branch V – Applied Chemistry)
CH 232/CL 232/CA 232 : ORGANIC CHEMISTRY – III

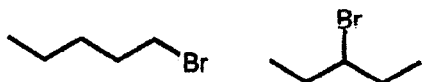
Time : 3 Hours

Max. Marks : 75

SECTION – A

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

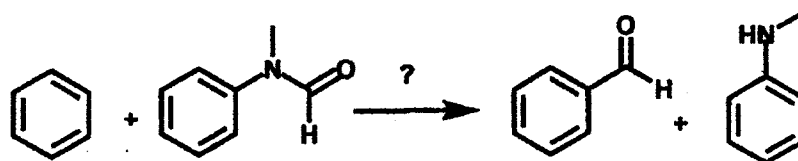
1. a) The vibrational fine structure in the absorption spectrum of phenol is clearly resolved in isooctane as the solvent whereas it is not when ethanol is used as the solvent. Explain why ?
- b) The absorption frequency of internal double bonds is very sensitive to ring size. It decreases from 1650 cm^{-1} in cycloheptene to 1566 cm^{-1} in cyclobutene. But in cyclopropene it is at 1656 cm^{-1} . Explain why ?
- c) Explain how the following isomeric pair can be distinguished by mass spectrometry ?



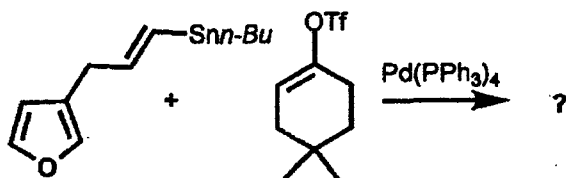
2. a) Generally more the electronegativity of the group more deshielded is the proton on the carbon bearing the substituent. On the contrary, the protons in CH_3CN have resonance at 1.97 ppm, whereas protons in CH_3Cl have resonance at 3.05 ppm. Explain why ?
- b) Predict the appearance of the ^1H NMR spectrum of isopropyl iodide.
- c) Explain why ^{13}C NMR spectrum of dimethylformamide shows three peaks. What changes will occur in the spectrum if the aldehyde hydrogen is selectively irradiated ?



3. a) Suggest reagent for the following reaction. Explain your choice with a suitable mechanism.



- b) Complete the following reaction. Justify your answer with a proper mechanism.



- c) What are the products formed when 2-methylcyclohexanone reacts with acrylonitrile under following reaction conditions
- Sodium ethoxide and
 - Pyrrolidine followed by hydrolysis
4. a) What is a Functional Group Interconversion ? Explain it using the synthesis of 4-aminobenzoic acid as an example.
- b) What is combinatorial synthesis ? Explain using a suitable scheme.
- c) Suggest a method for the preparation of cis diols. Explain the mechanism of the reaction.
5. a) Discuss about the use of protecting groups in peptide synthesis.
- b) Explain tacticity in polymers.
- c) What is B-DNA and explain its structural features. (10×2=20 Marks)

SECTION – B

Answer either (a) or (b) of each question and each question carries 5 marks :

6. a) Discuss about the application of IR spectroscopy in the study of hydrogen bonding.
- b) Give a brief account of different mass spectrometry techniques.
7. a) What is DEPT ? Explain it using isobutyl bromide as an example.
- b) Discuss about the principle and applications of 2D NMR.

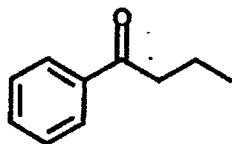


8. a) Discuss the applications of palladium reagents in organic synthesis. Illustrate with suitable examples and reaction mechanisms.
b) Compare and contrast the applications of Lithium Aluminum Hydride and Sodium Borohydride.
9. a) Discuss the usefulness of Umpolung strategy using benzoin condensation as an example.
b) Discuss the use of protecting groups in organic synthesis with suitable examples.
10. a) Outline the synthesis of Guanine.
b) Discuss about the mechanism and kinetics of free radical polymerization.
- (5×5=25 Marks)**

SECTION – C

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

11. Sketch the IR, ^1H NMR, ^{13}C NMR and mass spectra of the following compound.



12. Elucidate the possible structure of the compound with molecular formula $\text{C}_3\text{H}_7\text{OCl}$ using the following spectral data : IR (KBr, ν , cm^{-1}) : 3000-2870, 1459, 1125, 671; ^1H NMR (500 MHz, CDCl_3 , ppm) : 3.38 (3H, s), 3.63 (4H, m); ^{13}C NMR (125 MHz, CDCl_3 , ppm); 43, 59, 73; Mass spectra (m/z) 94, 77, 63, 49, 45, 28, 27, 15.
13. Give an account of different methods of reduction in organic synthesis.
14. Discuss about the synthetic applications of cycloadditions and 1, 3-dipolar cycloadditions.
15. Give a brief account of
a) Peptide synthesis and solid phase peptide synthesis
b) Protein sequencing.
- (3×10=30 Marks)**