

Reg. No. :

Name :

III Semester M.Sc. Degree (CBSS – Reg./Suppl./Imp.)

Examination, October 2021

(2018 Admission Onwards)

CHEMISTRY

CHE3C.09 : Organic Chemistry – III

Time : 3 Hours

Max. Marks : 60

SECTION – A

(Answer all questions in one word or one sentence. Each question carries one mark.)

1. Out of cis- and trans- isomer of cinnamic acid which isomer absorbs at higher wavelength ?
2. In an organic compound, there is no absorption in the region of 1600 cm^{-1} , 1580 cm^{-1} and 1500 cm^{-1} . This gives a sure proof absence of which functional group ?
3. Write the multiplicity of signals of $\text{CH}_3 - \text{CH}_2 - \text{NH}_2$ in ^1H NMR spectroscopy.
4. How will you account triplet splitting pattern of CDCl_3 at δ 76, 77, 78 ppm in ^{13}C NMR ?
5. Write the source of the electrons, which required for the bombardment in EI Mass spectrometry .
6. What do you mean by Nitrogen rule ?
7. By which name reaction oxetanes can be prepared ?
8. Write the structure of 1,2,4-triazine. (8×1=8)

SECTION – B

(Answer any eight questions. Answer may be in two or three sentences. Each question carries 2 marks.)

9. How will you account the difference in the value of λ_{max} in the following two compounds ? Discuss in detail.
a) $\text{CH}_3\text{Cl} - 173\text{ nm}$ b) $\text{CH}_3\text{I} - 258\text{ nm}$.

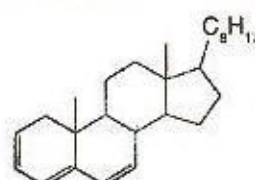
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10. If we add 20 ml of CCl_4 to 4 ml of ethyl alcohol how the position of O-H stretching frequency of ethyl alcohol is varied from the pure state ? Give a suitable explanation.

11. Calculate the λ_{max} of following compound by applying Woodward Fieser rule.



12. On oxidation 2-propanol will be converted to propanone. How can you monitor the progress of this reaction by IR spectroscopy ?
13. $\text{P-OMeC}_6\text{H}_4\text{-Me}$ shows in its ^1H NMR spectrum two peaks at δ (ppm) 2.34 and 3.75. Assign these two signals and comment about the signal positions.
14. What is the order of chemical shift of protons attached to tertiary, secondary, primary carbons ? Explain why.
15. How can you distinguish ethyl benzene from m-xylene by ^{13}C NMR spectroscopy ?
16. The proton decoupled ^{13}C NMR spectrum of $\text{C}_6\text{H}_5\text{Br}_3$ gives only two signals. Write the suitable structure of the compound and explain why spectrum follows this pattern.
17. How will you differentiate 3-methylcyclohexene from 4-methylcyclohexene by mass spectrometry ?
18. What is the importance of meta stable peaks ? Illustrate with example.
19. Discuss a method for the synthesis of 1,2,4-triazole with reaction.
20. Explain the method of synthesis of coumarin. (8×2=16)

SECTION – C

(Short paragraph questions. Answer any four questions. Each question carries 3 marks.)

21. What are batho, hypso, hypo and hyper chromic shift of absorption bands in UV-V is spectroscopy ? Illustrate with examples.

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22. How conjugation affect the stretching frequency of carbonyl compounds ? Explain with different examples.
23. Explain the usage of shift reagents in the simplification of NMR spectra.
24. Discuss the working principle of FAB mass spectrometry.
25. A compound with molecular formula $\text{C}_7\text{H}_6\text{O}$ shows peaks at δ (ppm) 9.8, s, 1H and 7.2, m, 5H. It is on reaction with hydroxylamine followed by P_2O_5 resulted another compound with molecular formula $\text{C}_7\text{H}_5\text{N}$ which showed an IR peak 2210 cm^{-1} and a ^1H NMR signal at δ (ppm) 7.3, s, 5H. Deduce the structure of these two compounds writing the reaction scheme.
26. Which is the preferred position of electrophilic substitution reaction in imidazoles and why ? Write examples for important electrophilic substitution reactions in imidazoles. (4×3=12)

SECTION – D

(Essay type questions. Answer four questions. Each question carries 6 marks.)

27. A) Explain Woodward-Fieser rules in predicting the λ_{max} of dienes, α , β -unsaturated carbonyl compounds and arenes with examples.

OR

- B) Discuss the concept of group frequencies in IR spectroscopy for structural elucidation illustrating with different classes of organic compounds.

28. A) Discuss :

- i) Simplification of complex spectra by using high field NMR
- ii) DEPT spectroscopy
- iii) CIDNP.

OR

- B) Discuss :

- i) Simplification of complex spectra by use of double resonance method
- ii) FT NMR spectroscopy
- iii) Theory of spin-spin splitting citing suitable example.

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29. A) Deduce the structure and stereochemistry of the compound from the following spectral data. Explain the pattern of each and every signals with suitable explanation.

- i) UV - 284 nm, 308 nm
- ii) IR - 1690 cm^{-1}
- iii) ^1H NMR - δ (ppm) - 6.7 (dd, $J = 16\text{ Hz}$, 8 Hz, 1H), 7.40 (m, 5H), 7.45 (d, $J = 16\text{ Hz}$, 1H), 9.75 (d, $J = 8\text{ Hz}$, 1H)
- iv) ^{13}C NMR - δ (ppm) - 128.2, 128.3, 128.8, 131.0, 134.0, 152.0, 193.0.
- v) Mass - m/z - 132, 131, 103

OR

- B) a) Deduce the structure of the compound from the following spectral data. Explain the pattern of each and every signals with suitable explanation.

- i) Molecular Formula- $\text{C}_{10}\text{H}_{12}\text{O}_2$
- ii) IR- $1730, 3000\text{ cm}^{-1}$
- iii) ^1H NMR - δ (ppm) - 6.8 - 7.3 (m, 5H), 4.3 (t, 2H), 2.93 (t, 2H), 2.0 (s, 3H)
- iv) Mass - m/z - 73, 91, 149, 164

- b) Fragmentation pattern in carbonyl compounds.

30. A) Discuss the structure, synthesis and reactions of

- i) Thietanes
- ii) Oxadiazoles
- iii) Quinolines

OR

- B) Discuss the structure, synthesis and reactions of

- i) Selenophenes
- ii) Pyrans
- iii) Azepins.

(4×6=24)