



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2013

CH 5508 - FUNDAMENTALS OF SPECTRASCOPY

Date: 13/05/2013 Dept. No.
Time: 9:00 - 12:00

Max. : 100 Marks

PART – A

Answer ALL questions.

(10 x 2 = 20 marks)

1. What are electromagnetic radiations?
2. Define the term resolution.
3. What are auxochromes? Give an example.
4. State Beer – Lambert's law.
5. Calculate the energy of radiation having wavelength 3500 Å°.
6. Name the source used in IR spectrometer.
7. What is Larmour procession frequency?
8. Define coupling constant.
9. State nitrogen rule.
10. What is a base peak in mass spectroscopy?

PART – B

Answer any EIGHT questions.

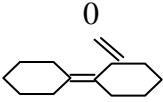
(8 x 5 = 40 marks)

11. Explain the relative population of different energy levels at various temperatures.
12. Discuss the differences between absorption and emission spectra.
13. Explain the instrumentation of photocalorimeter.
14. Describe the various types of absorption bands which results in electronic transitions.
15. Explain the Rayleigh scattering and Raman effect.
16. Discuss the fundamental frequency and overtones in IR spectroscopy?
17. How could you distinguish between $\text{CH}_3\text{CH}_2\text{OH}$ and $\text{CH}_3\text{-O-CH}_3$ by IR spectroscopy?
18. Explain spin-spin coupling with examples.
19. (a) The observed chemical shift of proton is 300 Hz from TMS and the operative frequency of the spectrometer is 100 MHz. Calculate the chemical shift in terms of $\delta(\text{ppm})$.
(b) Sketch the nmr spectrum of n-butane.
20. Predict the high-resolution proton-NMR spectra of $\text{CH}_3\text{CH}_2\text{Cl}$ and CH_3CHDCl .
21. Describe the importance of metastable peak and isotopic peak in mass spectral analysis.
22. Explain the fragmentation pattern of acetophenone.

PART – C

Answer ANY FOUR questions.

(4 x 10 = 40 marks)

23. a) Explain the Frank-Condon principle. (6)
b) Discuss the applications of UV-Spectroscopy. (4)
24. a) Explain the principle and instrumentation of flame photometry. (4)
b) Calculate λ_{\max} of
- (i)  (ii) $\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\underset{\text{CH}_2}{\parallel}}\text{C} - \text{COCH}_3$ (6)
25. a) Explain the cell sampling techniques in IR spectroscopy. (5)
b) Explain mutual exclusion principle. (5)
26. a) How will you distinguish p-amino acetophenone and p-methoxy acetophenone by IR method. (6)
b) Discuss the instrumentation of Raman spectroscopy. (4)
27. a) Explain the term chemical shift. What are factors influencing it? (6)
b) Discuss the nmr spectrum of cinnamaldehyde. (4)
28. a) Illustrate McLafferty rearrangement with a suitable example. (6)
b) Explain the fragmentation modes of n-hexane. (4)

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