LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – November 2009

CH 5508 - FUNDAMENTALS OF SPECTRASCOPY

Date & Time: 10/11/2009 / 9:00 - 12:00   Dept. No.   Max. : 100 Marks

PART – A

ANSWER ALL THE QUESTIONS   **(10 x 2 = 20 marks)**

1. If the electromagnetic radiation used by your mobile phone has a wave length of 0.1m, find its frequency and the type of radiation it belongs to.

2. Distinguish absorption spectra from emission spectra.

3. State Beer-Lambert's law.

4. Give the types of electronic transitions and arrange them in decreasing order of magnitude of wavelength.

5. Sketch the vibrational modes of H_2O and label each as IR active and inactive.

6. What is the difference between Stokes and anti-Stokes lines?

7. Write the Boltzman distribution formula.

8. Draw the expected ^1H NMR spectrum of isopropyl alcohol.

9. If one bromine atom is present in a molecule, give the mass spectral pattern of isotopic peak likely to occur.

10. Write the mass spectral fragmentations you would expect from benzyl alcohol.

PART – B

ANSWER ANY EIGHT QUESTIONS   **(8 x 5 = 40 marks)**

11. What is signal to noise ratio? How is the signal resolved?

12. Write a note on the relative population of transition energy states at different temperatures

13. Describe the principles involved in flame photometry

14. Explain chromphore and auxochrome. Give two examples each.

15. Write a note on the sampling technique in IR spectroscopy.

16. List out the differences between Rayleigh scattering and Raman scattering

17. 'IR spectroscopy is complementary to Raman spectroscopy'. Justify.

18. Define Chemical shift. Aromatic protons absorb at around δ = 7.3 whereas alkyl protons absorb at lower field. Why?

19. Give the advantages of using TMS as the reference in ^1H NMR spectral analysis.

20. What are metastable peaks? What inferences can be made from them?

21. How is Beer – Lambert's law verified?

22. Mention the factors governing absorption maximum and intensity with reference to electronic spectra.

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PART- C

ANSWER ANY FOUR QUESTIONS   **(4 x10 = 40 marks)**

23. a) Describe the components of a photoelectriccolorimeter.

    b) Explain the principle of AAS.

24. Draw and label the block diagram of UV-Visible spectrophotometer and explain.

25. Describe the instrument used for Raman spectroscopy.

26. a) Enlist the applications of IR spectroscopy.

    b) How can it be used to differentiate?

        (i) an ester from carboxylic acid

        (ii) intermolecular H-bonding from intramolecular H-bonding

27. a)What is McLafferty rearrangement? Give an example.

    b) What inferences can you make from base peak and molecular ion peak?

28. Explain the instrumentation used for NMR spectroscopy. Give a brief note on its applications in molecular structural elucidation with two examples.

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