LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **BIO-TECHNOLOGY**

SECOND SEMESTER – APRIL 2010

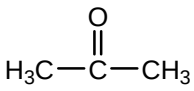
CH 2901 - INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

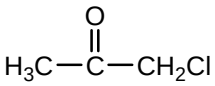
Date & Time: 28/04/2010 / 1:00 - 4:00 Dept. No. Max. : 100 Marks

PART A

Answer all the questions. 10 x 2 = 20

1. Calculate the pH of 0.001 M HCl.
2. Is NaOH a primary standard substance? Justify your answer.
3. Define ppm and ppb.
4. What is the principle involved in turbidometry?
5. What is Hydrogen electrode? Mention its advantages.
6. Mention the advantages of quinhydrone electrode.
7. Justify the –I and +I effects for the following compounds

(a) 

(b) 

8. Define the term Chemical Shift.
9. What are the selection rules in ESR Spectra?
10. What is meant by hyperfine splitting?

PART B

Answer any eight questions. 8 x 5 = 40

11. How will you determine the pH of a solution using glass electrode?
12. Calculate the pH of a solution obtained by mixing 5 g of acetic acid and 7.5 g of sodium acetate and making the volume equal to 500 ml (dissociation constant of acetic acid is 1.8×10^{-5} M.W of acetic acid and sodium acetate are 60 and 82 respectively)
13. Derive Beer-Lambert's Law and explain the reasons for the deviations of the law.
14. Derive Henderson equation for a basic buffer.
15. Discuss the application of Circular Dichroism.
16. How will you determine magnesium in water sample?
17. What are the factors influencing Chemical shift?
18. Write the difference between stretching vibration and bending vibration.
19. How many signals are obtained in the ESR spectrum of Methyl radical?

20. Calculate the frequency of the microwave required to bring about resonance for a free Electron (g_e = 2.003) kept in a magnetic field of strength 3000G. (Magnetic moment of an Electron = $9.274*10^{-28}JG^{-1}$

21. Describe the intensity of diffracted beam by electron diffraction.

22. What are the applications of Neutrons?

PART C

Answer any four questions. 4 x 10 = 40

23. Draw and explain the working principle of single beam spectrophotometer.

24. Explain the principle and instrumentation of turbidometry.

25. Discuss the qualitative analysis of Cd and Pb by AAS.

26. Sketch the titration curve of acid base titration by potentiometer method and explain.

27. i) What is the principle of HPLC?
ii) Explain with diagrams Flame ionisation and electron capture detectors of Gas Chromatography.

28. a) Discuss the principle of ESR spectrometer
b) Describe the various parts of an ESR Spectrometer and explain their functions.

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