LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – **APRIL 2013**

CH 1505/CH 1502/CH 5501 - ANALYTICAL CHEMISTRY

Date: 09/05/2013 Dept. No. Max. : 100 Marks
Time: 1:00 - 4:00

PART – A

Answer ALL questions: **(10 x 2 = 20 marks)**

1. How many significant figures are there in each of the following.
   a. The concentration of copper in tap water was 0.00000572 M
   b. The concentration of glucose in blood was 5.0 mM.
2. What first aid should be given for spillage of concentrated acid and strong alkali on a person?
3. What is R_f value?
4. What is recrystallization?
5. What is a secondary standard? Give an example.
6. Distinguish between the terms *end point* and *equivalence point*.
7. What are adsorption indicators?
8. What is gravimetric factor?
9. A mixture of CaO and $CaCO_3$ is analyzed using TG. The thermogram shows one reaction between 500 and 900^o C where the mass of the sample decreases from 125.3 to 95.4 mg. What is the percentage of $CaCO_3$ in the sample?
10. What are the advantages of DTA over TGA?

PART – B

Answer any EIGHT questions: **(8 x 5 = 40 marks)**

11. How are water sensitive and acid sensitive chemicals stored and handled?
12. The normality of a solution is determined by four separate titrations, the results being 0.2041, 0.2049, 0.2039 and 0.2043. Calculate the average deviation and standard deviation.
13. Discuss the principle of distillation under reduced pressure.
14. Explain the functioning of FID in GC.
15. Describe the principle of TLC.
16. What are the requirements of a primary standard? Mention two examples of primary standard.
17. Explain how EDTA is used in direct, back titration methods.
18. Discuss quinonoid theory of acid-base indicators.
19. How is chloride determined by Volhard method?
20. What is precipitation from homogeneous solution? Explain.
21. Write a brief description of DTA apparatus.
22. Sketch and explain TGA curves for the decomposition of $CaC_2O_4.H_2O$.

PART – C

Answer any FOUR questions: **(4 x 10 = 40 marks)**

23. a. Define standard deviation and coefficient of variation. (4)

b. Thirty replicate analyses of the protein content of a sample gave the following results. Calculate the standard deviation and coefficient of variation.

Protein content in g/L

10.6	11.2	11.7	12.3	12.4	12.7
12.8	12.8	13.2	13.2	13.2	13.4
13.5	13.7	13.7	13.8	13.9	14.0
14.1	14.2	14.4	14.6	14.6	14.8
15.3	15.3	15.9	16.1	16.3	16.6

(6)

24. Explain the principle and methodology behind the separation of ions using ion-exchange chromatography.

25. a. Find the pH of 1.25 M acetic acid and 0.75 M potassium acetate. K_a of acetic acid $= 1.74 \times 10^{-5}$. (5)

b. Derive Henderson equation. (5)

26. a. Write a brief note on metal ion indicators. (5)

b. How is paper chromatographic separation carried out? (5)

27. Distinguish between co precipitation and post precipitation. Discuss the various mechanisms by which co precipitation can occur.

28. Explain in detail the factors that affect the shape of TGA curves.

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