LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – NOVEMBER 2016

16PCH1MC04 / CH 1809 / CH 1815 - ANALYTICAL CHEMISTRY

Date: 09-11-2016   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

Part-A

Answer ALL questions.   **(10 × 2 = 20)**

1. What are the common errors encountered in gravimetric analysis?

2. Mention the differences between HPLC and electrophoresis.

3. State the working principle of pneumatic pump.

4. Cadmium was determined in an alloy and the following values were obtained. 4.3, 4.1, 4.0, 3.2, 4.2, 3.9 and 4.0 µg/g. Check whether the value 3.2 µg/g needs to be rejected? The critical value is 0.570.

5. What is the principle followed in electron capture detector?

6. What is the need for masking agents in a complexometric titration? Give an example.

7. What mass of KIO_4 is needed to prepare 250 ml of 0.2 N solution as per the redox reaction ? $IO_4^- + I^- + H^+ \longrightarrow I_2 + H_2O$. Use the balanced equation for your calculation.

8. Mention any two applications of DTA.

9. In a coulometric titration 25 ml of Ce (IV) was reduced by electrolytically generated Fe(II) at 250 mA current in 15 min. Calculate the concentration of Ce(IV).

10. Compare the two types of burners used in AAS. How do they differ from each other?

Part-B

Answer any EIGHT questions.   **(8 × 5 = 40)**

11. Write van Deemeter equation and explain the terms involved.

12. Explain any three methods of elimination of errors.

13. State the principle of electrophoresis and explain the phenomenon.

14. Discuss the working principle of thermal conductivity detector with a diagram.

15. Explain the determination of quinine by fluorimetry.

16. What is the significance of thermal compartments in gas chromatography? Explain with suitable examples.

17. Calculate the normality of (i) nitric acid solution containing 6.3 g/L (ii) KOH solution containing 11.2g/L.

18. Explain the principle and reactions of titrations in glacial acetic acid medium.

19. Give a detailed account of various thermoanalytical techniques with its uses.

20. Explain the principle of controlled potential coulometry.

21. How is sulphate determined by turbidimetry?

22. Explain the principle of inductively coupled plasma spectrometry.

1

Part-C

23. Write a short note on the following:

    a. Inter-system crossing

    b. Effect of structural rigidity on fluorescence

    c. Gross errors

    d. Purification of solvents in HPLC

24a. Analysis of citric acid in lemon juice yielded the following % values

    7.11, 7.18, 7.14, 7.07, 7.14, 7.16, 7.09, 7.12, 7.21 and 7.08. Calculate the average deviation, standard deviation and variance. **(6)**

  b. Distinguish between solute and bulk property detectors with examples. **(4)**

25a. What are the sample injection systems available for injecting liquid and gaseous samples in gas chromatography? Explain with a neat diagram. **(6)**

  b. State the principle of GSC and GLC. **(4)**

26a. Discuss the principle of acid base titration with an example highlighting the need for choice of indicators. **(5)**

  b. Show that $pH = \frac{1}{2} pK_w + \frac{1}{2} pK_a - \frac{1}{2} pK_b$ for the hydrolysis of a weak acid and a weak base.

  (5)

27. a. Draw and interpret the DTA and TGA thermograms of calcium oxalate monohydrate

  (6)

  b. How is the following chemical equilibrium studied potentiometrically?

$$Ce^{3+} + Fe^{3+} \rightleftharpoons Ce^{4+} + Fe^{2+}$$ **(4)**

28 a. Discuss the determination of alkali metals in serum using AAS. **(5)**

  b. Explain the principle of FES **(5)**

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