



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2017

17/16PCH1MC04 - ANALYTICAL CHEMISTRY

Date: 10-11-2017
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2= 20)

1. The result of an analysis was determined as 16.75 g while the accepted value was 16.14 g. Calculate the percentage of absolute error and relative error.
2. Which value should be rejected on the basis of Q-test for % of iron in an alloy? The values are 5.3, 5.0, 5.1, 5.2, 4.1, 5.5 and 5.6 ($Q_{crit}=0.51$)
3. State the principle of gas-solid chromatography.
4. What is the height equivalent to theoretical plate for a column with 200 cm in length with net number of plates as 1636?
5. Define the term auto-protolysis constant of solvents.
6. How much of 0.6N NaOH must be added to 600ml of 0.3N NaOH in order to prepare a solution of 0.2N?
7. Write the factors affecting thermogram.
8. Write down any two structural features of biochemical electrodes.
9. State Beer-Lambert's law.
10. What are the differences between AAS and FES?

Part-B

Answer any EIGHT questions.

(8 × 5= 40)

11. What is normal error curve? Mention its importance.
12. Which type of analysis can be evaluated by F-test? Mention the significance of this analysis.
13. Discuss the principle of TLC. How is TLC performed?
14. Write the different types of detectors used in GC. Explain the flame ionization detector with a neat diagram.
15. Discuss the different types of column packing in HPLC.
16. Explain the principle and reactions involved in complexometric titrations.
17. Discuss the principle of nephelometry and turbidimetry.
18. In the thermogravimetric analysis of 0.250g of $\text{Ca}(\text{OH})_2$, the loss in weight at different temperatures was (a) 0.018g at 100-150°C(loss of hygroscopic water),(b) 0.038g at 500-560°C(dehydration),(c) 0.0229 at 900-950°C(dissociation). Determine the composition of $\text{Ca}(\text{OH})_2$.
19. Draw the circuit diagram for coulometric titrations. Discuss the applications of this technique.

20. Write a note on the solid state ion selective detectors.
21. How is the amount of phosphate in a given sample determined nephelometrically?
22. What are the factors that influence fluorescence emission?

Part-C

Answer any FOUR questions.

(4 × 10= 40)

- 23a. Explain in detail the various types of error. How can they be minimized?
 - b. The mean of ten results in gravimetric analysis is 56.06, with a standard deviation, $S = 0.2\%$. Calculate the 95% confidence limit ($t=1.833$). (7+3)
- 24a. How are C,H,N and S determined using GC?
 - b. State and explain the principle of electrophoresis. (5+5)
25. Derive an expression of pH for the reaction between salt of strong base and weak acid.
- 26a. Explain the thermogravimetric analysis of calcium oxalate monohydrate. Draw the thermogram.
 - b. How is controlled potential coulometry used to estimate antimony(III)ion? (5+5)
- 27a. Draw and interpret the thermogram of copper sulphate pentahydrate obtained in thermogravimetric analysis.
 - b. Explain the principle of flame emission spectroscopy. (5+5)
28. Discuss the principle, instrumentation and applications of AAS.
