

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – CHEMISTRY
FIRST SEMESTER – NOVEMBER 2019
PCH 1504 – ANALYTICAL CHEMISTRY

Date: 07-11-2019
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2= 20)

1. Write the differences between additive and proportional errors with examples.
2. The weight percent of an element in a sample gave the following results 55.95, 56.00, 56.04, 56.08 and 56.23. Apply the Q-test to check if the value 56.23 can be discarded or not. ($Q_{\text{cri}}=0.54$)?
3. Mention the advantages of HPLC over GLC.
4. Calculate minimum height (H) of plate if $A=0.01$, $B=0.30 \text{ cm}^2/\text{mL}$, $C=0.155$ and $U=0.287 \text{ mL/mt}$.
5. Why are masking agents used in complexation titration? Write any two masking agents.
6. Calculate the degree of hydrolysis of ammonium acetate. The dissociation constant for NH_4OH is $4.0 \times 10^{-5} \text{ M}$ and that of CH_3COOH is $1.8 \times 10^{-6} \text{ M}$. Calculate its pH value.
7. Differentiate between primary coulometric analysis and secondary coulometric analysis.
8. State the Faraday's laws of electrolysis.
9. Write any two factors that influence fluorescence emission.
10. State the principle of turbidimetry.

Part-B

Answer any EIGHT questions.

(8 × 5= 40)

11. Explain any three methods of minimization of errors.
12. The antibiotic assay of a fermented broth was done by two methods and the data obtained are given below. Assess the precision of the two methods. ($F_{\text{cri}}=5.05$)
Method I ($\mu\text{g/l}$). 2.3, 2.4, 2.2, 2.1, 2.4
Method II ($\mu\text{g/l}$) 2.5, 2.6, 2.2, 2.3, 2.7
13. How are cations in a mixture separated by HPLC?
14. What are the different types of column used in GC? Explain.
15. What is FID? Explain its working principle.
16. Explain the principle involved in complexometric titrations.
17. Explain the effect of autoprotolysis constant and dielectric constant on solvent behavior.
18. Derive an expression for pH for the hydrolysis of a salt of weak acid and weak base.
19. Explain the characteristics of solid state ion selective detectors.
20. Explain the principle of controlled potential coulometry.
21. Compare premix and total consumption burners used in AAS.
22. Discuss the principle of flame photometry.

Part-C

Answer any FOUR questions.

(4 × 10= 40)

- 23.a. Apply 't' test and 'F' test to check whether two sets of data differ significantly or not.
(5)
- b. Analysis of chloride by two different method of a sample gave the following results.
 $\bar{x} \pm s_x = 20.05 \pm 0.12$ ($N_x = 6$)

$$\bar{y} \pm s_x = 20.21 \pm 0.07 \quad (N_x = 5)$$

- Is there a statistically significant difference between x and y? Explain. (5)
24. Discuss the principle, instrumentation and applications of capillary electrophoresis. (5)
- 25.a. Discuss the levelling effect of solvents with suitable example. (5)
- b. Write briefly about the characteristics of hydrolysis of salts. (5)
- 26.a. List out the various thermo analytical methods along with the properties measured and instruments used in each type. (5)
- b. How is copper estimated in electrogravimetry? (5)
- 27.a. Draw and explain the thermogram obtained for $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. (5)
- b. Describe the thermal behavior of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ in DTA. (5)
28. What is meant by spectrophotometric titration? How are they carried out? Explain the different types of spectrophotometric titrations with examples.
