

7. (a) Calculate the amount of metal extracted in a single extraction from 200 ml aqueous phase containing 800 mg of metal ion using 50 ml organic solvent with $D = 120$.
- (b) Define the terms distribution coefficient and distribution ratio and explain their significance in solvent extraction processes.
- (c) Describe the different mechanisms involved in the solvent extraction. 5,5,5
8. (a) Explain the process of sample delivery in flame spectroscopy and describe how atomization of the sample is achieved during the analysis.
- (b) Job's method (method of continuous variations) is used to determine the stoichiometry of a complex formed between two substances. Briefly explain how the method works and how the stoichiometric ratio is determined from the experimental data.
- (c) Define resolution in chromatography, Briefly describe its importance in separating mixture components and mention the main factors that influence it. 5,5,5

[This question paper contains 4 printed pages]

Your Roll No. :**Sl. No. of Q. Paper** : **5618** **I**

Unique Paper Code : 2173012016

Name of the Paper : DSE : Analytical
Methods in ChemistryName of the Course : **B.Sc.(H) Chemistry**

Semester : VI

Medium of the Question : English

Paper

Time : 3 Hours **Maximum Marks : 90****Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **six** questions in all.
1. (a) Discuss the concept of blank analysis in analytical chemistry and discuss its role in minimizing systematic errors.
- (b) Analyze the statement "Good precision does not guarantee accuracy" with relevant examples.

- (c) Discuss the standard addition method for quantifying the concentration of an unknown analyte, emphasizing its advantages over other calibration techniques.

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2. (a) Compare atomic absorption spectroscopy (AAS) with atomic emission spectroscopy (AES) in terms of how they are used in analysis and their Limitations.

- (b) Describe the construction and working of an Electrodeless Discharge Lamp (EDL)

- (c) Define chemical interference and elaborate on its implication in Atomic Absorption Spectroscopy (AAS). Provide examples.

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3. (a) Define thermal gravimetric analysis (TGA) and discuss its applications in materials characterization.

- (b) A mixture of MgO and MgCO_3 loses mass during heating. If the mass drops from 160 mg to 132 mg between 500-800°C, calculate the percentage composition of MgCO_3 .

- (c) Differentiate between Differential Scanning Calorimetry (DSC) and Differential Thermal Analysis (DTA) based on their principle, instrumentation and application.

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4. (a) Explain the principles and applications of Thin Layer Chromatography (TLC), emphasizing its advantages over conventional column chromatography methods.

- (b) Differentiate between cationic and anionic exchangers, providing examples of each.

- (c) Discuss the significance of plate height and effective plate number in chromatographic separations.

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5. (a) Describe the electronic transitions responsible for UV-Visible spectra and elucidate the concept of molar absorptivity.

- (b) Explain the concept of charge transfer transitions in UV-Visible spectroscopy.

- (c) What is the function of a monochromator in UV-Visible Spectrophotometry? Glass-cuvettes are not suitable for recording the UV region spectrum. Explain.

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6. (a) Explain how Q-test is useful for rejecting or retaining of data?

- (b) Define accuracy and precision in the context of analytical measurements. Discuss strategies for improving both.

- (c) In a dataset of five measurements : 12.4, 12.6, 12.5, 12.7, 12.3 g compute the mean, standard deviation and relative standard deviation.

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