

SEMESTER – II

Course II - ANALYTICAL CHEMISTRY-2

60hrs (4h/w)

QUANTITATIVE METHODS OF ANALYSIS

Objectives:

The objective of this course is to make students aware about the gravimetric and volumetric methods of analysis, various types of titrations, equilibria principles, various centrifugation methods, polarography and environmental analysis.

Course Learning Outcomes:

At the completion of this course, students should be able to understand:

Various quantitative methods of analysis like Gravimetric Analysis
Volumetric methods of analysis, Various Centrifugation Methods, Polarography and Environmental Analysis

UNIT – I

12hrs

Gravimetric Analysis - I

A. Precipitation methods. General principles

B. Volatilization methods. General principles - determination of the sodium hydrogen carbonates content of antacid tablets

C. Properties of precipitates and precipitating reagents: Particle size, Filterability of Precipitates - Crystalline Precipitates - Co-precipitation - Precipitation from Homogeneous

D. Drying and Ignition of precipitates

UNIT – II

12hrs

Volumetric Analysis

A. Definitions: Titrimetry, Volumetric titrimetry, Gravimetric titrimetry, Coulometric titrimetry.

B. The equivalence point, the end point; Classification of volumetric methods, theory of indicators and buffers – Equilibria Principles - Aqueous and non-aqueous acid-base titration - Redox titrations - Complexometric titrations - Precipitation titrations

C. Typical problems in volumetric titrimetry:

D. Sigmoidal Titration Curves

UNIT – III

12hrs

Centrifugation Methods:

A. Introduction

VSVS/K
lect in analytical chemistry

- B. Sedimentation and relative centrifugal force
- C. Different types of rotors.
- D. Density gradient
- E. Types of centrifugation techniques.

UNIT – IV

12hrs

Polarography

Basic principles – Dropping Mercury Electrode (DME) – Advantages and Disadvantages.
Diffusion current – The Ilkovic equation (derivation not required). Half – Wave potential –
Experimental set up – Applications. Determination of Copper and Zinc in Brass.

UNIT – V

12hrs

Introduction to Environmental Analysis:

- A. Sampling method
- B. Environmental pollution from industrial effluents and radiochemical waste.
- C. Introduction to water and waste analysis.

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LABORATORY COURSE -II

30 hrs (2 h / w)

Practical-II Quantitative Analysis (At the end of Semester-II)

1. Determination of the pKa and Equivalent Weight of a weak acid by potentiometric pH titration.
2. Determination of the strength of the given magnesium sulphate solution using EDTA and Eriochrome black -T as the indicator.
3. Determination of the capacity of an anionic exchange resin.
4. Homogeneous precipitation of the Nickel as its Dimethyl glyoxime.
5. Analysis of soil
 - i) Determination of pH of soil.
 - ii) Determination of total soluble salts.
 - iii) Determination of carbonate and bicarbonate.

Suggested Readings:

1. Analytical Chemistry- Methods of Separation (R.V. Dilts).
2. Laboratory Handbook of Chromatographic Methods (O. Mikes, R.A. Chalmers).
3. F.W. Fifield and D. Kealy: Analytical Chemistry.
4. Vogel's textbook of quantitative chemical analysis, 6th edition.
5. Vogel's textbook of quantitative chemical analysis, 7th edition.
6. Keith Wilson and John Walker: Practical Biochemistry.

Teaching Learning Process:

Conventional chalk and board teaching,

Visit chemical industries to get information about the technologies and environmental pollution from industrial effluents.

ICT enabled classes. Power point presentations. Interactive sessions, Debate.

Assessment Methods:

Presentations by Individual Student

Class Tests

Written assignment(s)

End semester University theory and practical examination

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lect in analytical chemistry

MODEL PAPER

FIRST YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-II

ANALYTICAL CHEMISTRY Course-II; QUANTITATIVE METHODS OF ANALYSIS

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Explain in brief about the co-precipitation of Gravimetry.
2. Explain in brief about the general practical gravimetric procedures
3. Write short note on Coulometric titrimetry.
4. Explain the theory of indicators and buffers?
5. What are the different types of rotors used in centrifugation?
6. What is polarography write its applications
7. Write the Ilkovic equation and explain its significance
8. Explain the different types of sampling methods adopted in environmental analysis

PART- B

5 X 10 = 50 Marks

Answer **ALL** the questions. Each carries **TEN** marks

9 (a). Explain the general principles of precipitation methods of gravimetric analysis

(or)

(b). Explain the general principles of volatilization methods of gravimetric analysis

10 (a). Write an essay on the Aqueous and non-aqueous acid-base titration with examples

(or)

(b). Explain the redox titration, Complexometric titrations and precipitation titrations with examples

11 (a). Describe the determination of Copper and Zinc in brass using polarography

(or)

(b). Explain the experimental set up the instruments used in Polarography and write its applications

12 (a). Explain the sedimentation and relative centrifugal force in detail

(or)

(b). Explain the different types of centrifugation techniques with examples

13 (a). Explain the Environmental pollution from industrial effluents and radiochemical waste

(or)

(b). What are the water pollutants and explain the different methods of waste analysis?

VBVK
Section Analytical Chem

SEMESTER -11

Course 11 - ANALYTICAL CHEMISTRY-2

60hrs (4h/w)

QUANTITATIVE METHODS OF ANALYSIS

Objectives:

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Course Learning Outcomes:

At the completion of this course, students should be able to understand:

Various quantitative methods of analysis like Gravimetric Analysis

Volumetric methods of analysis, Various Centrifugation Methods, Polarography and Environmental Analysis

UNIT -1

12hrs

Gravimetric Analysis - I

- A. Precipitation methods. General principles
- B. Volatilization methods. General principles - determination of the sodium hydrogen carbonates content of antacid tablets
- C. Properties of precipitates and precipitating reagents: Particle size, Filterability of Precipitates - Crystalline Precipitates - Co-precipitation - Precipitation from Homogeneous
- D. Drying and Ignition of precipitates

UNIT -11

12hrs

Volumetric Analysis

- A. Definitions: Titrimetry, Volumetric titrimetry, Gravimetric titrimetry, Coulometric titrimetry.
- B. The equivalence point, the end point; Classification of volumetric methods, theory of indicators and buffers — Equilibria Principles - Aqueous and non-aqueous acid-base titration - Redox titrations - Complexometric titrations - Precipitation titrations C. Typical problems in volumetric titrimetry.
- D. Sigmoidal Titration Curves

UNIT -111

12hrs

Centrifugation Methods:

- A. Introduction
- B. Sedimentation and relative centrifugal force
- C. Different types of rotors. D. Density gradient
- E. Types of centrifugation techniques.

UNIT - IV

12hrs

Polarography

Basic principles — Dropping Mercury Electrode (DME) — Advantages and Disadvantages.
Diffusion current — The Ilkovic equation (derivation not required). Half — Wave potential
— Experimental set up — Applications. Determination of Copper and Zinc in Brass.

UNIT - V

12hrs

Introduction to Environmental Analysis:

- A. Sampling method
- B. Environmental pollution from industrial effluents and radiochemical waste.
- C. Introduction to water and waste analysis.



Practical-II Quantitative Analysis (At the end of Semester-II)

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Class Tests

Written assignment(s)

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MODEL PAPER
FIRST YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-II
ANALYTICAL CHEMISTRY ~~Course-II; QUANTITATIVE~~ METHODS OF ANALYSIS

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Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

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8. Explain the different types of sampling methods adopted in environmental analysis

PART- B

5 X 10 = 50 Marks

Answer ALL the questions. Each carries TEN marks

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(or)
(b). Explain the general principles of volatilization methods of gravimetric analysis
- 10 (a). Write an essay on the Aqueous and non-aqueous acid-base titration with examples
(or)
(b). Explain the redox titration, Complexometric titrations and precipitation titrations with examples
- 11 (a). Describe the determination of Copper and Zinc in brass using polarography
(or)
(b). Explain the experimental set up the instruments used in Polarography and write its applications
- 12 (a). Explain the sedimentation and relative centrifugal force in detail (or)
(b). Explain the different types of centrifugation techniques with examples
- 13 (a). Explain the Environmental pollution from industrial effluents and radiochemical waste
(or)
(b). What are the water pollutants and explain the different methods of waste analysis?