

Syllabus

Savitribai Phule Pune University

T. Y. B. Sc., Semester - V (CH-502)

Analytical Chemistry Syllabus (2021-2022)

Chapter1:Gravimetry

[9 L]

Introduction to gravimetric analysis; Precipitation methods; The colloidal state; Supersaturation and precipitate formation; The purity of the precipitate; Co-precipitation; Conditions of precipitation; Precipitation from homogeneous solution; Washing the precipitate; Ignition of the precipitate: quantitative separations based upon precipitation methods: Fractional precipitation; Organic precipitants (8-hydroxyquinoline, DMG, Cupferron, Nitron and Benzoin-alfa oxime, Anthranilic acid), Gravimetric Calculations

How Much Analyte is there (Ref - 3) Application of Gravimetry: Determination of Al(III) by 8-hydroxyquinoline, Determination of calcium as oxalate; Determination of potassium as potassium tetraphenylborate, Determination of phosphate as ammonium molybdophosphate, Numericals, Key Reference-1: 417-428, 433-444, 446, 451, 564, 485; [Supplementary Ref.-2: Pp-342 to 362]

Chapter2:InorganicQualitativeAnalysis

[7 L]

Basic principle, common ion effect, solubility, solubility product, preparation of original solution, classification of basic radicals in groups, separation of basic radicals, removal of interfering anions (phosphate and borate), detection of acid radicals. Ref. - 6

Chapter 3: Thermal methods of analysis

[6 L]

General discussion, Thermogravimetry, Experimental factors affecting TG analysis, instruments for thermogravimetry, Applications: Thermogravimetric analysis of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, Differential Thermal Analysis: Introduction, instrumentation for DTA and DSC, experimental and instrumental factors, applications: DTA of copper sulphate pentahydrate, Purity of pharmaceutical by DSC, Key Reference-2: 503-522, [Supplementary reference, Ref-4: 884-890, Ref-1: 428-433]

Chapter 4: Parameters of instrumental analysis

[4 L]

Techniques, Methods, Procedures and Protocols, Selecting an Analytical Method, Accuracy, Precision, Sensitivity, Selectivity, Robustness and Ruggedness, Scale of Operation, equipment, Time and Cost, Making the Final Choice, Developing the Procedure, Calibration and Standardization, Sampling, Validation, Protocols, Key Reference - 5:35-48.

Chapter5:UV-VisibleSpectroscopy

[10 L]

Introduction, Theory of spectrophotometry and colorimetry-Beer's law, Application of Beer's Law, Spectrophotometry: Wavelength selection by prism and diffraction grating, Radiation Source, cells, data presentation, single-beam spectrophotometer, Double-beam spectrophotometers, Choice solvent, general procedure for colorimetric estimation, simultaneous analysis, Application: Estimation of metal ions from aqueous solution : Boron in steel, Chromium in steel with diphenyl carbazide reagent, ammonia in water, Chloride, Primary amine, Determination of phenol, spectrophotometric titration (example Cu(II) with EDTA), Determination of pKa value of indicator, Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method., Numericals

Key Reference-2: 658-717 and Ref-1: 645-725.

References:

1. Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Deney, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)
2. Vogel's textbook of Inorganic Quantitative Analysis, Mendham, Deney Barnes, 6th Ed, Pearson education.
3. Analytical Chemistry by G. D. Christian, et al, Wiley, 6th Ed.
4. Principle of Instrumental Analysis; Holler, Skoog, Crouch 6th Ed. Thomson Publication.
5. Modern Analytical Chemistry, David Harvey, Mc-Graw Hill Higher education.
6. Vogel's Qualitative Inorganic Analysis, G. Svehla, Pearson, 7th Ed.