

## Syllabus

### UNIT-I: Non- aqueous Titrations

Theoretical considerations, scope and limitations, Acid- Base equilibria in non- aqueous media, Titration of weak bases, Titration of weak acids, Indicators, Pharmaceutical products should be selected for illustrating applications in drug analysis and quality control.

### UNIT- II: Complexometric Titrations

Concept of complexation and Chelation, Werner's coordination number, Electronic structure of some complex ions, stability constants, titration curves, masking and demasking agents, types of complexometric titrations, metal- ion indicators, and applications in drug analysis.

### UNIT-III: Miscellaneous methods of analysis

Basic principles, instruments and applications of

- Diazotisation titrations
- Kjeldahl method of nitrogen estimation
- Determination of water by Karl- Fisher titration
- Oxygen flask combustion
- Gasometry

### UNIT- IV: Chromatography

Fundamentals of following techniques will be discussed with relevant examples of pharmaceutical and/or natural products- TLC, HPTLC, HPLC, GLC, Paper chromatography and column chromatography.

### UNIT-V: Extraction Procedures

Liquid- solid extraction, Liquid- liquid Extraction, Separation of mixtures by extraction, distribution law, Successive extraction separation of drugs from excipients.

### UNIT- VI: Electrochemistry

The electric cell, electrode potential, half- cells, sign convention, Nernst equation, salt bridge, activity series, standard potential, standard hydrogen electrode, reference electrode, indicator electrode, measuring the relative voltage of half- cell and calculations of std. potential.

Potentiometry: Theoretical consideration, ions- selective electrode, measurement of potential location of the end point, instrumentation, analytical applications. pH meter, definition of pH, relationship between pH and potential, equipment and applications.

Conductometry: Ohm's law, Specific resistance, specific conductance, conductivity cell, ionic conductivity during titration, change in volume during conductometric titration, methods and instrumentation

Columetric titration: Principle and applications, controlled potential coulometry, cell design, instrumentation, methods, electrode selection and advantages and limitations.

Polarography: Theory, mass transport process, current potential relationship, polarization, choice of electrode, effect of oxygen, instrumentation and calculations of concentrations.

Amperometric titrations and its applications.

## Practical List

Practical List:

- Non-aqueous titrations: preparation and standardization of perchloric acid and sodium/ potassium/ lithium methoxides solutions. Estimation of some pharmacopoeial products.
- Complexometric titrations: preparation and standardization of EDTA solution, some exercise related to pharmacopoeial assays by complexometric titrations.
- Miscellaneous Determinations: Exercise involving diazotisation, Kjeldahl method of nitrogen estimation, Oxygen flask combustion and Gasometry methods. Determination of alcohol content in liquid galenicals, procedure (BPC) shall be covered.
- Experiments involving separation of drugs from excipients.
- Chromatographic analysis of some pharmaceutical products.
- Exercise based on acid base titration in aqueous and non aqueous media, oxidation- reduction titration using potentiometric techniques, determination of acid- base dissociation constants and plotting of titration curves using pH meter
- Exercise involving polarimetry.
- exercise involving conductometric and polarographic techniques.

**Text Book(s):**

1. Chatten, L.G., Pharmaceutical Chemistry Vol. I & II., Marcel Dekker, Inc., N.Y.

2. Beckett, A.H. & Stenlake, J.B., Practical pharmaceutical chemistry., Athlone Press, London..

**Reference Book(s):**

1. Kolthoff, I.M. and Stenger, V.A. Volumetric Analysis Vol. II Titration Methods, Interscience Pub., N.Y.

