Pharmaceutical Analysis-I

(Code: BP102T)

Semester I - First Year B. Pharmacy

As Per PCI Regulations

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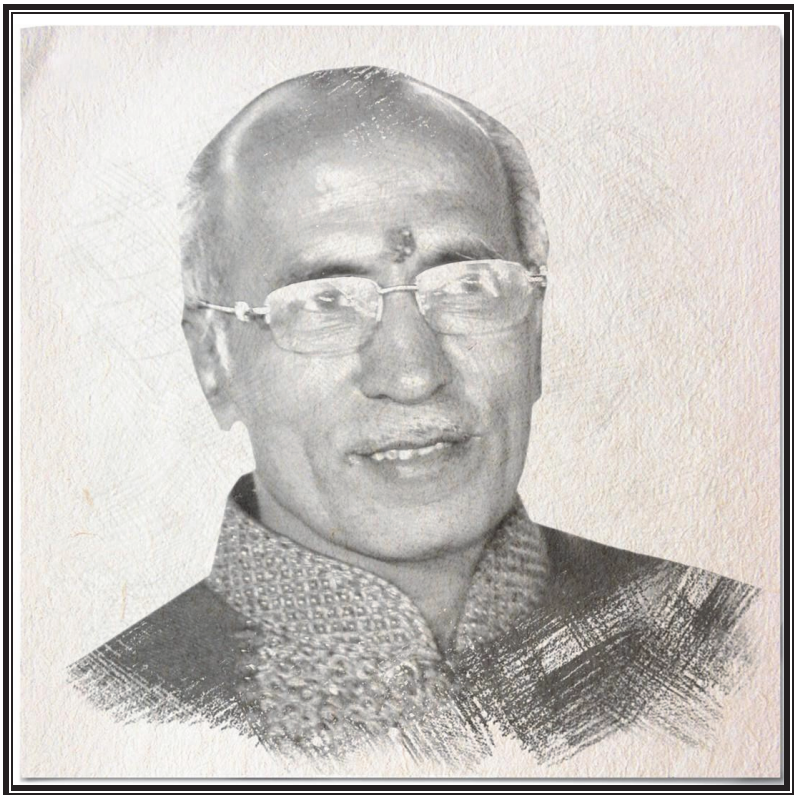
We dedicate this Publication soulfully and wholeheartedly,
in loving memory of our beloved founder director,
Late Shri. Pradeepji Lalchandji Lunawat,
who will always be an inspiration, a positive force and strong
support behind us.



"My work is my prayer to God"

- Lt. Shri. Pradeepji L. Lunawat

Soulful Tribute and Gratitude for all Your
Sacrifices, Hardwork and 40 years of Strong Vision…

Preface

My Dear Students,

We extremely happy to present this book on ***"Pharmaceutical Analysis-I"*** *for you. We have divided the subject into small chapters so that the topics can be arranged and understood properly. The topics within the chapters have been arranged in a proper sequence to ensure smooth flow of the subject.*

We present this book in the loving memory of ***Late Shri. Pradeepji Lunawat,*** *our source of inspiration and a strong foundation of* ***"TechKnowledge Publications"****. He will always be remembered in my heart and motivate me to achieve my milestone.*

We thankful to Mr. Shital Bhandari, Shri. Arunoday Kumar and Shri. Chandroday Kumar for the encouragement and support that they have extended. We also thankful to Seema Lunawat for technology enhanced reading, E-books support and the staff members of TechKnowledge Publications for their efforts to make this book as good as it is. We have jointly made every possible efforts to eliminate all the errors in this book. However if you find any, please let us know, because that will help us to improve further.

We also thankful to my family members and friends for patience and encouragement.

- Authors

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About The Authors

Dr. Vishnu P. Choudhari is currently working as Associate Professor in Pharmaceutical Analysis and Quality Assurance at School of Pharmacy, Dr. Vishwanath Karad, MIT World Peace University, Kothrud, Pune. He has 8 years of Industrial and 20 years of academic experience. He has completed his pharmacy graduation and post graduate education from Pune University and completed PhD form Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. He has various research papers to his credit, published in national and interactions journals and presented his work in various seminars and conferences. He had two patents to his credit and introduced "Post Graduate diploma in regulatory Affairs" a Post graduate diploma program for Pharmacy and life science graduates. His areas of research include analytical method development and validation, isolation of phytochemicals, Herbal drug standardization, drug-drug interactions, etc.

Dr. Vishnu P. Choudhari

Dr. Arti Swami is currently working as Assistant Professor at Dr. Vishwanath Karad MIT World Peace University, School of Pharmacy, Pune. She has completed her Ph. D in Pharmaceutical Chemistry from Savitribai Phule Pune University. She holds a rich academic and research experience of 11 Years in the area of Analytical Chemistry and Quality Assurance. She has to her credit no. of research papers in reputed national and international journals. She has also published books for the subject Pharmaceutical Analysis. Her area of research include stability indicating analytical method development by using chromatographic methods like HPTLC, HPLC and hyphenated techniques, impurity profiling. She is life member of Association of Pharmaceutical Teachers of India (APTI) and Indian Pharmaceutical Association (IPA).

Dr. Arti Swami

SYLLABUS

PHARMACEUTICAL ANALYSIS - I (BP102T)

Scope

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.

Objectives

Upon completion of the course a student shall be able to understand :

- *The principles of volumetric and electrochemical analysis.*
- *Carry out various volumetric and electrochemical titrations.*
- *Develop analytical skills*

Course Contents

UNIT I

(a) Pharmaceutical analysis : Definition and scope

(i) Different techniques of analysis

(ii) Methods of expressing concentration

(iii) Primary and Secondary standards **(Refer Chapter 1)**

(b) Errors : Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures. **(Refer Chapter 2)**

(C) Pharmacopoeia : Sources of Sources of impurities in medicinal agents, limit tests. **(Refer Chapter 3)**

UNIT II

(a) Acid base titration : Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves. Preparation and standardization of sodium hydroxide, hydrochloric acid, sulphuric acid, Estimation of ammonium chloride. **(Refer Chapter 4)**

(b) Non aqueous titration : Solvents, acidimetry and alkalimetry titrations, and estimation of sodium benzoate. **(Refer Chapter 5)**

UNIT III

(a) Precipitation titrations : Mohr's method, Volhard's method, Modified Volhard's method, Fajans method, and estimation of Sodium Chloride I.P. **(Refer Chapter 6)**

(b) Complexometric titration : Classification, metal ion indicators, masking and demasking reagents, and estimation of Calcium gluconate I.P. **(Refer Chapter 7)**

(c) Gravimetry : Principle and steps involved in gravimetric analysis. Purity of the precipitate : co-precipitation and post precipitation, and estimation of Barium sulphate I. P. **(Refer Chapter 8)**

UNIT IV

Redox titrations

(i) Concepts of oxidation and reduction

(ii) Preparation and standardization of Potassium Permanganate I. P., Ceric Ammonium Sulphate I.P./B. P. and Sodium Thiosulphate I. P./B. P. **(SPPU)**

(iii) Types of redox titrations (Principles and applications) : Permaganometry, Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titrations with Potassium Iodate I. P. **(Refer Chapter 9)**

UNIT V

(a) Electrochemical methods of analysis **(Refer Chapter 10)**

(i) Conductometry : Introduction, Conductivity cell, Conductometric titrations, applications. **(Refer Chapter 11)**

(ii) Potentiometry : Electrochemical cell, construction and working of reference (Standard Hydrogen Electrode, Silver Chloride Electrode and Calomel Electrode) and Indicator Electrodes (Metal electrodes and Glass Electrode), methods to determine end point of potentiometric titration and applications. **(Refer Chapter 12)**

(iii) Polarography : Principle and llkovik Equation. **(Refer Chapter 13)**

(b) Refractometry : Introduction, refractive index, specific and molar refraction, measurement of RI, Abbe's refractometer and applications. **(SPPU)** **(Refer Chapter 14)**

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Unit I

Unit III

Syllabus : Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.

Syllabus : Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate I.P.

Syllabus : Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, and estimation of Barium sulphate I. P.

Unit IV

Syllabus : Concepts of oxidation and reduction, Preparation and standardization of Potassium Permanganate I. P., Ceric Ammonium Sulphate I. P./B. P. and Sodium Thiosulphate I. P./B. P.

Types of redox titrations (Principles and applications) : Permaganometry, Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titrations with Potassium Iodate I.P.

Chapter 12 : Potentiometry **12-1 to 12-26**

Syllabus : Electrochemical cell, construction and working of reference (Standard Hydrogen Electrode, Silver Chloride Electrode and Calomel Electrode) and Indicator Electrodes (Metal electrodes and Glass Electrode), methods to determine end point of potentiometric titration and applications.

Chapter 13 : Polarography **13-1 to 13-12**

Syllabus : Principle and Ilkovic Equation.

Chapter 14 : Refractometry **14-1 to 14-9**

Syllabus : Introduction, refractive index, specific and molar refraction, measurement of RI, Abbe's refractometer and applications.

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