TEXTBOOK OF

PHARMACEUTICAL CHEMISTRY

For Diploma in Pharmacy First Year

Based on Education Regulation 2020 (New PCI Syllabus)

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PROBECELL PRESS

ISBN No. 978-81-953544-2-9

First Edition 2021

Published by

Probecell Press

Block H1, Chauhan Town, Bhilai

Chhattisgarh-490020, India

Website - www.probecell.com

Email - info@probecell.com

Printed by

Sagar Printers

Near Purani Basti, Police Station

Amin Para, Raipur, Chhattisgarh, India

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Acknowledgment

We are thankful to Dr. Sonia Bajaj, Assistant Professor in Faculty of Zoology at Shri Shankaracharya Mahavidyalaya, Juwani road, Bhilai for the Hindi translation of this book. She completed her M.Sc. (Zoology) in the year 1999 from Government Science College Durg, Chhattisgarh, Ph.D. (Zoology) in the year 2003 from Pt. RaviShankar Shukla University Raipur, Chhattisgarh, India. She has 14 years of teaching experience. She is a PhD. Guide (Zoology) from Hemchand Yadav University, Durg. She has completed one UGC sponsored Minor project and organised several National and International Seminar and Conferences.In addition, she is a life time member of Global Academic Society. She has several awards in her credits. She has published various research papers in reputed journals and published 02 book and 01 book chapter to her credits. Her area of interest is in the field of Icthyology, Biodiversity and Physiology.

Preface

The textbook of Pharmaceutical Chemistry has been written for students of diploma in pharmacy first-year students keeping in mind specific requirements of the Pharmacy Council of India (PCI), Education Regulation - 2020. This is a bilingual book in both English and Hindi for easy understanding to students. This book is covering the entire syllabus as per new PCI norms including practicals and previous year questions.

This book containing thirteen chapters covering pharmaceutical inorganic chemistry and medicinal chemistry topics. Chapter 1 is introduction to pharmaceutical chemistry containing limit tests, error in analysis, scope, significant figures and quality control methods. Chapter 2 is volumetric analysis containing fundamentals, acid and base theories and titrations. Chapter 3 is related to inorganic pharmaceuticals comprise of hematinics and antacids. Chapter 4 belongs to heterocyclic compounds and their nomenclature. Chapter 5-13 belongs to synthesis and classification of medicinal drugs and their chemistry used in the treatment of several disorder.

I would like to acknowledge the invaluable contributions provided by the Probecell editorial team. I give great thanks to the graphic designers who were instrumental in preparing much of the artwork for this text. I would also like to acknowledge my colleagues and students for their willingness to serve as test subjects for many of the useful contents in this book. Finally, I would like to thank my teachers and parents for their guidance, support, and encouragement throughout the process of completing this book.

“Don’t take rest after your first victory because if you fail in second, more lips are waiting to say that your first victory was just luck. ” — A. P. J. Abdul Kalam.

We expect to bring out new editions in the coming years. Suggestions to improve the content are welcome from the teachers and students.

Bhilai
10.09.2021

Gajendra Singh Thakur
Tarun Chaudhary
Anuj Bhatnagar
Parag Jain
Dharmendra Lal

Contents

Experiments

Experiment no.	Title
1	To perform the limit test for chloride in a given sample of simple water
2	To perform the limit test for sulphate in a given sample of simple water
3	To perform the limit test for iron in a given sample of simple water
4	To perform the limit test of heavy metals in given sample as per I.P.
5	To perform the limit test for Arsenic in the given sample
6	To identification tests for Anions and Cations as per Indian Pharmacopoeia
7	To prepare and standardization of 0.1 N sodium hydroxide solution using direct titration
8	To determine the Normality of given sample of 0.1N Potassium permanganate
9	To perform assay of Ferrous sulphate (redox titration) I.P. 1996
10	To perform assay of Calcium gluconate (complexometric Titration) IP 1996
11	To perform assay of Sodium chloride (Modified Volhard's method) I.P.
12	To perform assay of Ascorbic acid (Cerimetry Titration) I.P.
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CHAPTER 1
INTRODUCTION TO PHARMACEUTICAL CHEMISTRY

Introduction

The term 'Pharmaceutical' is used for any chemical substance use in the cure, preventive, therapeutic, or which is uses in the preparation of medicine. Pharmaceutical Chemistry is the branch of chemistry that deals with the chemical, biochemical and pharmacological aspects of drugs. It involves synthesis, isolation, identification, structural elucidation, structural modification, Structural Activity Relationship (SAR), a study of the chemical characteristics, and its pharmacological effects.

Inorganic Chemistry- It is the branch of chemistry is the study of all the elements and their compounds except carbon and its compounds (which is studied under organic chemistry). Which branches of inorganic chemistry include coordination chemistry, chemistry, organometallic compounds, bioinorganic and synthetic inorganic chemistry.

Objectives: The main objective of inorganic pharmaceuticals are the following ways.

- Useful medicinally for its therapeutic purpose. Example: Astringents and antimicrobials etc.
- Useful as pharmaceutical aids such as bentonite, talc, etc.
- To change the reaction of body fluid in acidifying or alkalize such as antacids, alkalis, mineral acids.
- Replacing or replenishing the normal content of body fluids. Example: Sodium, potassium, calcium, chloride, phosphate, etc.
- Useful as reagents to carry out the reactions. Example: Catalysts (platinum, nickel) oxidizing and reducing agents (lithium aluminum hydride).
- Useful in pharmaceutical analysis. Example: Titrants such as potassium permanganate etc.
- To determine tests for quantitative and qualitative analysis of pharmaceutical substances.
- To study about limit test

परिचय

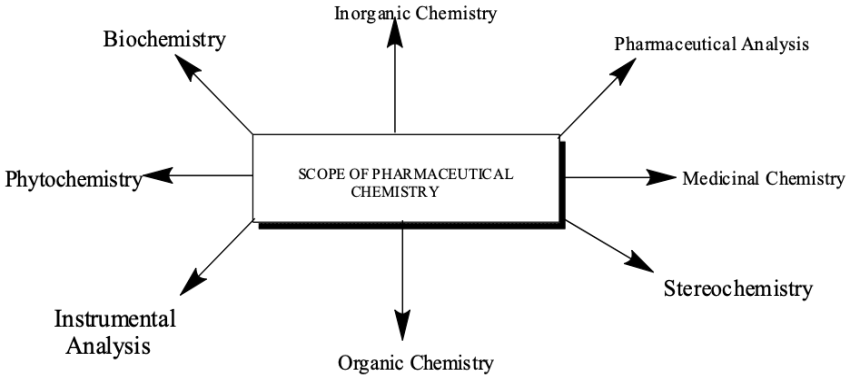
'फार्मास्युटिकल' शब्द का उपयोग किसी भी रासायनिक पदार्थ के इलाज, निवारक, चिकित्सीय या दवा की तैयारी में उपयोग होने वाले किसी भी रासायनिक पदार्थ के लिए किया जाता है। फार्मास्युटिकल केमिस्ट्री रसायन विज्ञान की वह शाखा है जो दवाओं के रासायनिक, जैव रासायनिक और औषधीय पहलुओं से संबंधित है। इसमें संश्लेषण, अलगाव, पहचान, संरचनात्मक व्याख्या, संरचनात्मक संशोधन, संरचनात्मक गतिविधि संबंध (एसएआर), रासायनिक विशेषताओं का अध्ययन और इसके औषधीय प्रभाव शामिल हैं।

अकार्बनिक रसायन विज्ञान– यह रसायन विज्ञान की शाखा है जिसमें कार्बन और उसके यौगिकों को छोड़कर सभी तत्वों और उनके यौगिकों का अध्ययन किया जाता है (जिसका अध्ययन कार्बनिक रसायन विज्ञान के तहत किया जाता है)। अकार्बनिक रसायन विज्ञान की किन शाखाओं में समन्वय रसायन विज्ञान, रसायन विज्ञान, ऑर्गोमेटेलिक यौगिक, जैव अकार्बनिक और सिंथेटिक अकार्बनिक रसायन शामिल हैं।

उद्देश्य: अकार्बनिक फार्मास्यूटिकल्स का मुख्य उद्देश्य निम्नलिखित तरीके हैं।

- चिकित्सीय प्रयोजन के लिए औषधीय रूप से उपयोगी। उदाहरण: कसैले और रोगाणुरोधी आदि।
- बेंटोनाइट, तालक आदि जैसे फार्मास्यूटिकल एड्स के रूप में उपयोगी।
- एंटासिड, क्षार, खनिज एसिड जैसे अम्लीकरण या क्षारीकरण में शरीर के तरल पदार्थ की प्रतिक्रिया को बदलने के लिए।
- शरीर के तरल पदार्थ की सामान्य सामग्री को बदलना या फिर से भरना। उदाहरण: सोडियम, पोटेशियम, कैल्शियम, क्लोराइड, फॉस्फेट आदि।
- अभिक्रियाओं को अंजाम देने के लिए अभिकर्मकों के रूप में उपयोगी। उदाहरण: उत्प्रेरक (प्लैटिनम, निकल) ऑक्सीकरण और कम करने वाले एजेंट (लिथियम एल्यूमीनियम हाइड्राइड)।
- भेषजीय विश्लेषण में उपयोगी। उदाहरण: टाइटेनियम जैसे पोटेशियम परमैंगनेट आदि।
- भेषज पदार्थों के मात्रात्मक और गुणात्मक विश्लेषण के लिए परीक्षण निर्धारित करना।
- सीमा परीक्षण के बारे में अध्ययन करने के लिए

Scope of pharmaceutical chemistry



Errors in pharmaceutical analysis

In pharmaceutical analysis, the ultimate result of the analysis is important from an accuracy and reliability point of view. The term accuracy refers to the agreement of experimental result with the true value and it is usually expressed in terms of errors.

Accuracy is defined as refers to how closely a measured value agrees with the correct value.

Precision is defined as the degree of agreement between various results of the same quantity that is the reproducibility of a result.