

As Per New Syllabus (CBCS Pattern and NEP 2020)

Shivaji University, Kolhapur

B.Sc. Part-II : Semester-IV

INORGANIC CHEMISTRY

CHEMISTRY (DSC-D3) : PAPER-VII

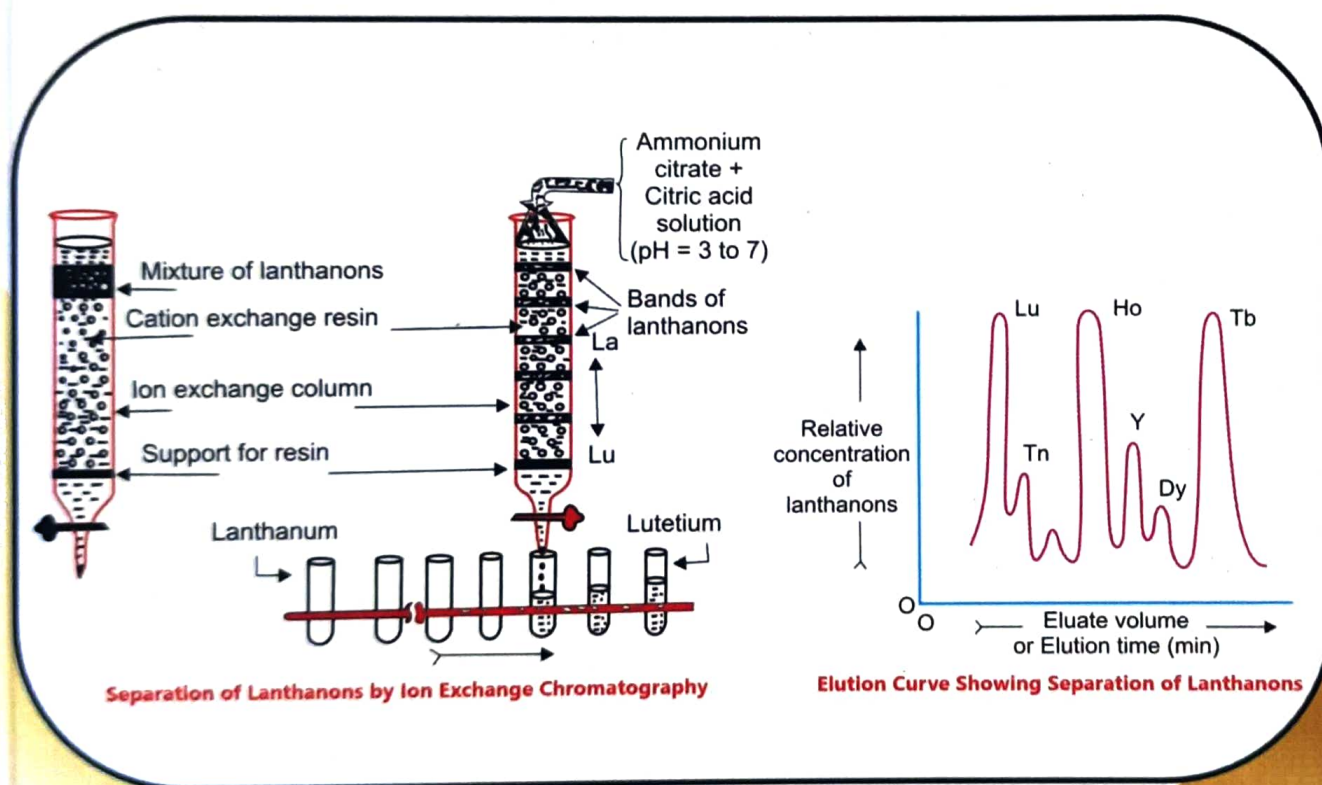
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A TEXT BOOK OF

INORGANIC CHEMISTRY

(DSC-D3 : Paper - VII)
B.Sc. Part II : Semester IV

New Changed CBCS Syllabus of Shivaji University,
Kolhapur w.e.f. June 2023 as per NEP-2020

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First Edition : February 2024**© : Authors**

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**Published By :
NIRALI PRAKASHAN**

Abhyudaya Pragati, 1312, Shivaji Nagar,
Off J.M. Road, Pune - 411005
Tel - (020) 25512336/37/39
Email : niralipune@pragationline.com

Polyplate**Printed By :
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PREFACE

This book is basically intended for B.Sc. Part-II students for Semester-IV Course of Shivaji University, Kolhapur. This book is written according to new NEP-2020 Pattern syllabus being implemented from June 2023 prescribed by Shivaji University, Kolhapur.

It is our great pleasure to present this book to the students and respected teachers in proper time. The subject matter is presented in simple and lucid language. This book covers all the chapters mentioned in the syllabus. The material is presented in a comprehensive way and the sequence of articles in each chapter helps the students to understand the subject with ease.

Different diagrams and illustrative description is provided to enhance the learning and understanding of the matter by students as well as to enable the teachers to explain the difficult concepts properly. The long answer type questions and short answer type questions including multiple type questions are given at the end of each chapter.

We are thankful to Nirali Prakashan, Pune for making us a part of their team of Authors. We thank Mr. Dineshbhai Furia and Mr. Jignesh Furia for publishing this book.

Last but not the least we are very much indebted to Mr. Virbhaval Shinde (Marketing Executive, Kolhapur District) and Mr. Ashok Nanavare (Marketing Executive, Sangli District) for their nice co-operation. We are very much thankful to Mr. Kiran Kamble (Proof Reading), Mrs. Shraddha Shedge (Graphic Design) and Mr. Malik Shaikh for a neat and error free D.T.P. of this book.

We hope that this book will be found useful by students and teachers. We will appreciate any suggestions for the improvement of the book.

Authors

SYLLABUS

Unit 1 : Co-ordination Chemistry

(08 Hrs.)

- 1.1 Introduction-Definition and Formation of Co-ordinate Covalent Bond in $\text{BF}_3 - \text{NH}_3$, $[\text{NH}_4]^+$ and H_2O
- 1.2 Terminology - Description of the Terms - Ligand, Co-ordination Number, Co-ordination Sphere
- 1.3 Effective Atomic Number Rule
- 1.4 Distinguish between Double Salt and Complex Salt
- 1.5 Werner's Theory
 - 1.5.1 Postulates
 - 1.5.2 The Theory as applied to Cobalt Ammines viz. $\text{CoCl}_3 \cdot 6\text{NH}_3$, $\text{CoCl}_3 \cdot 5\text{NH}_3$, $\text{CoCl}_3 \cdot 4\text{NH}_3$, $\text{CoCl}_3 \cdot 3\text{NH}_3$
- 1.6 IUPAC Nomenclature of Coordination Compounds
- 1.7 Isomerism in Complexes with C.N. = 4 and 6
 - 1.7.1 Geometrical Isomerism
 - 1.7.2 Optical Isomerism
 - 1.7.3 Structural Isomerism-Ionization Isomerism, Hydrate Isomerism, Coordination Isomerism, Linkage Isomerism and Co-ordination Position Isomerism
- 1.8 Valence Bond Theory of Transition Metal Complexes with respect to C.N. = 4, Complexes of Cu and Ni, C.N. = 6, Complexes of Fe and Co.

Unit 2 : Chelation

(04 Hrs.)

- 2.1 A Brief Introduction with respect to Ligands, Chelating Agent, Chelation and Metal Chelates
- 2.2 Structural Requirements of Chelate Formation
- 2.3 Difference between Metal Chelate and Metal Complex
- 2.4 Classification of Chelating Agents (with specific illustration of Bidentate Chelating Agents)
- 2.5 Applications of Chelation with respect to Chelating Agents - EDTA and DMG

Unit 3 : Chemistry of Elements of 3d Series Elements

(06 Hrs.)

- 3.1 Position of Elements in the Periodic Table
- 3.2 Characteristics of d-block elements with special reference to
 - (i) Electronic structure
 - (ii) Oxidation states, stability of oxidation states of Fe with respect to Latimer diagram
 - (iii) Magnetic character
 - (iv) Coloured ions
 - (v) Complex formation.

Unit 4 : Chemistry of 4f Elements (Lanthanides) (05 Hrs.)

- 4.1 Position of Lanthanides in the Periodic Table
- 4.2 Occurrence
- 4.3 Characteristics of 4f Elements with Special Reference to
 - 4.3.1 Electronic Configuration
 - 4.3.2 Oxidation States
 - 4.3.3 Magnetic Properties
 - 4.3.4 Lanthanide Contraction
- 4.4 Separation of Lanthanides by Ion Exchange Method

Unit 5 : Inorganic Semi-micro Qualitative Analysis (07 Hrs.)

- 5.1 Theoretical Principles involved in Qualitative Analysis
- 5.2 Applications of Solubility Product and Common Ion Effect in Separation of Cations into Groups.
- 5.3 Applications of Complex Formation in
 - (a) Separation of II Group into IIA and IIB Sub-groups.
 - (b) Separation of Copper from Cadmium.
 - (c) Separation of Cobalt from Nickel.
 - (d) Separation of Cl^- , Br^- , I^- .
 - (e) Detection of NO_2^- , NO_3^- (Brown Ring Test).
- 5.4 Applications of Oxidation and Reduction in
 - (a) Separation of Cl^- , Br^- , I^- in the mixture
 - (b) Separation of NO_2^- and NO_3^- in the mixture
- 5.5 Spot Test Analysis.

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