

As Per New Syllabus (NEP 1.0)
Shivaji University, Kolhapur
B.Sc. Part-III : Semester-VI

INORGANIC CHEMISTRY

CHEMISTRY (DSE-F5) : PAPER-XIII

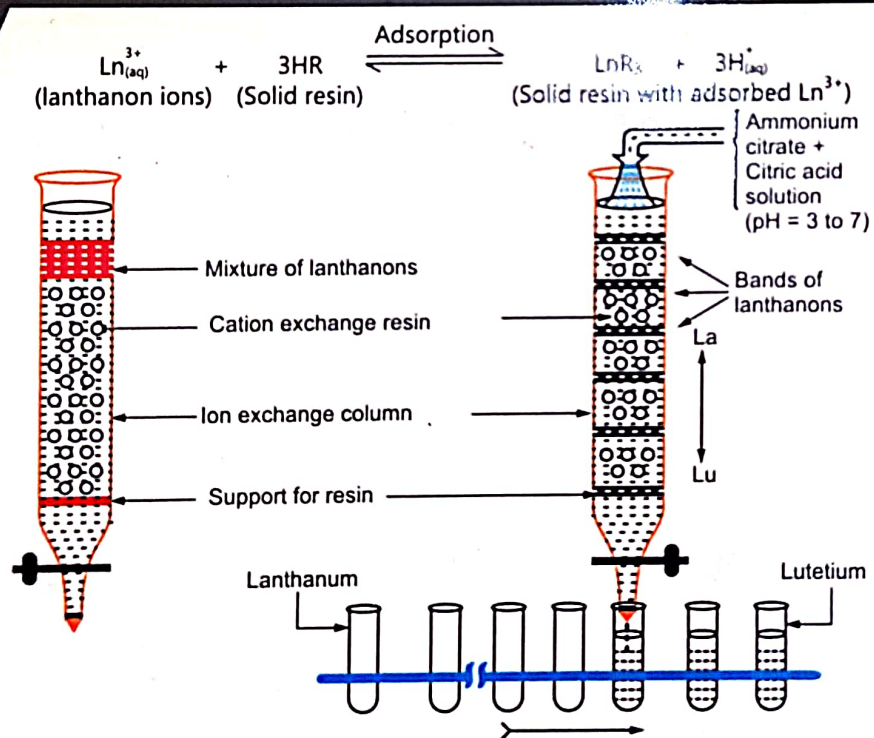
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Prof. (Dr.) PRAVINA B. PISTE

Prof. (Dr.) ARJUN S. KUMBHAR

Prof. (Dr.) REKHA A. NALWADE



Separation of Lanthanons by Ion Exchange Chromatography

A Text Book Of
INORGANIC CHEMISTRY

DSE - F5 : Paper - XIII

FOR

B.Sc. Part - III : Semester - VI

**As Per New Revised NEP 1.0 Pattern Syllabus of
Shivaji University, Kolhapur w.e.f. June 2024**

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Syllabus

Unit 1 : Coordination Chemistry

[09]

(A) Inorganic Reaction Mechanism

- Introduction.
- Classification of Mechanism: Association, Dissociation, Interchange and the Rate Determining Steps.
- S_N^1 and S_N^2 Reactions for Inert and Labile Complexes.
- Mechanism of Substitution in Cobalt (III) Octahedral Complexes.
- Trans effect and its Theories.
- Applications of Trans effect in the synthesis of Pt(II) Complexes.

(B) Thermodynamic and Kinetic Aspects of Metal Complexes

- Introduction.
- Thermodynamic Stability.
- Kinetic Stability.
- Relation between Thermodynamic and Kinetic Stability.
- Stepwise Stability Constant.
- Factors affecting the Stability of Complexes.
- Determination of Stability Constant by Job Variation, Mole Ratio and Slope Ratio Method.

Unit 2 : Nuclear Chemistry

[04]

- Nuclear Reactions and Energetics of Nuclear Reactions.
- Types of Nuclear Reactions.
- Artificial Transmutation.
- Artificial Radioactivity.
- Nuclear Fission and its Application in Heavy Water Nuclear Reactor.
- Nuclear Fusion.
- Use of Thorium, Uranium and Plutonium in Atomic Energy.
- Applications of Radio-Isotopes as Tracers.
- Chemical Investigation – Esterification.
- Structural Determination – Phosphorus Pentachloride.
- Analytical Chemistry – Isotopic Dilution Method for the determination of Volume of Blood.
- Age Determination – Dating by C^{14} .

Unit 3 : Chemistry of *f*-Block Elements

[07]

(A) Lanthanides

- Introduction.
- Occurrence.
- Electronic Configuration.
- Oxidation State.
- Lanthanides Contraction.
- Separation of Lanthanides by Ion Exchange Method.

(B) Actinides

- Position in the Periodic Table.
- Electronic Configuration.
- General Methods of Preparation of Transuranic Elements.
- Neutron Capture – followed by β decay.
- Accelerated Projectile Bombardment.
- Heavy Ion Bombardment.
- IUPAC Nomenclature of Super Heavy Elements with Atomic Number (Z) greater than 100.

Unit 4 : Iron and Steel

[06]

- Occurrence and Ores of Iron.
- Definition of Terms - Ore, Mineral, Slag, Flux, Gangue, Matrix, Calcinations, Reduction, Roasting, Smelting and Leaching.
- Extraction of Iron by Blast Furnace.
- Steel : Definition and Types.
- Conversion of Cast Iron into Steel by :
 - Bessemer process.
 - L.D. process.
 - Heat Treatment on Steel.

Unit 5 : Bio-inorganic Chemistry

[04]

- Introduction.
- Essential and Trace Elements in Biological Process.
- Metalloporphyrins with special reference to Hemoglobin and Myoglobin.
- Biological role of Alkali and Alkaline Earth Metal Ions with special reference to Na^+ , K^+ and Ca^{2+} .



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