UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN CHEMISTRY
SYLLABUS WITH EFFECT FROM 2020-2021

BCY-DSC07

CORE-VII: INORGANIC CHEMISTRY – I

Learning Outcomes

1. Learning the unique characteristics of lanthanide and actinide series
2. Learning the fundamentals of coordination chemistry and its applications in analytical chemistry ; Understanding the biological importance of complexes
3. Learning the theories of acids and bases

Semester	Subject Title	Total Hours	Credit
V	**INORGANIC CHEMISTRY – I**	60	4

UNIT I: CHEMISTRY OF f-BLOCKELEMENTS (15 hrs)

General characteristics of f-block elements - Comparative account of lanthanides and actinides - Occurrence, Oxidation states, Magnetic properties, Colour and spectra - Lanthanides and Actinides Separation by ion-Exchange and Solvent extraction methods - Lanthanide contraction-Chemistry of thorium and Uranium-Occurrence, Ores, Extraction, properties and uses - Preparation, Properties and uses of ceric ammonium sulphate, thorium dioxide and uranyl acetate.

UNIT II:COORDINATION CHEMISTRY (15 hrs)

Types of ligands, IUPAC Nomenclature, Isomerism - Ionisation, hydrate, linkage, ligand and coordination isomerism. Stereoisomerism-geometrical and optical isomerism in 4 & 6 coordinated complexes. Theories of coordination compounds - Werner and Sidgwick EAN concept , ValenceBond theory - hybridisation, geometry and magnetic properties of $[Ni(CN)_4]^{2-}$, $[NiCl_4]^{2-}$, $[Fe(CN)_6]^{4-}$, $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$. Crystal field theory – spectrochemicalseries, splitting of d- orbitals in octahedral and tetrahedral complexes, low spin & high spin complexes. Explanation of colour and magnetic properties using CFT, comparison of VBT andCFT.

UNITIII:APPLICATIONOFCOORDINATIONCOMPOUNDS (12 hrs)

Application of coordination compounds - Estimation of nickel using DMG and aluminium using oxine . Estimation of hardness of water using EDTA . Biologically important coordination compounds - Chlorophyll, haemoglobin, vitamin - B_{12} . (their structure and applications). Metal Carbonyls : Mono and Poly nuclear Carbonyls of Ni, Fe, Cr, Co and Mn- Synthesis, structures and bonding.

UNIT IV: CHEMISTRY OFBINARYCOMPOUNDS (10 hrs)

Classification, preparation, properties and uses of hydrides, borides, carbides and nitrides

UNIT V: CONCEPTS OF ACIDSANDBASES (8 hrs)

Theories of acids and bases - Arrhenius theory, Bronsted- Lowry theory - basicity of an acid and acidity of a base - relative strengths of acids and bases, Cady - Esley concept - general theory of solvent system, Lux - Flood concept - Lewis acids - bases concept in coordination chemistry - classification of Lewis acids, Usanovich concept. Concept of Hard and Soft Acids and Bases (HSAB). Types of solvents: Protic and aprotic solvents-aqueous and non aqueous solvents-liquid ammonia and liquid HF as solvents.

TEXT BOOK

1. Puri B.R., Sharma L.R. and Kalia K.C., Principles of Inorganic Chemistry, 33rd ed., New Delhi,Mile stone publishers and distributers,2016.
2. Textbook of Inorganic Chemistry, R Gopalan, Universities Press Private Limited, Chennai,2009

BOOKS FOR REFERENCE

1. Lee J.D., Concise Inorganic Chemistry, 5th ed., Blackwell Science,2005.
2. Sharpe Alan G. Inorganic Chemistry, ELBS andLongman,1981.
3. Soni P.L., and Mohan Katyal, Text book of Inorganic Chemistry, 20th ed., S.Chand& Co., New Delhi,2006.
4. Malik Wahid U., Tuli G.D. and Madan R.D., Selected Topics in Inorganic Chemistry, 7th ed., S.Chand&Company Ltd., New Delhi,2007.
5. James EHuheey, Ellen AKeiter, Richard LKeiter and OkhilKMedhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Pearson India,2011.
6. Gurdeep Raj Chatwal and Harish Mehre, Advanced Inorganic Chemistry, 7th ed., Goel Publishing House,Meerut.