

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

**BCY-DSC10**

**CORE-X: INORGANIC CHEMISTRY – II**

Learning Outcomes

1. Learning the theories of metallic bonding
2. Introduced to organometallic compounds
3. Introduced to fundamental concepts of nuclear chemistry and radioactivity
4. Learning the chemistry of clathrates, phosphazenes, silicates

Semester	Subject Title	Total Hours	Credit
VI	INORGANIC CHEMISTRY – II	75	5

**UNIT I: METALLIC BONDING (15hrs)**

Metallic state - Packing of atoms in metal (BCC , FCC , HCP and simple cube) - Theories of metallic bonding - Electron gas , Pauling and band theories - Semi conductors- n- type and p- type, transistors - Uses - superconductors - examples, types - structures of alloys - substitutional and interstitial solid solutions- Hume-Rothery ratio.

**UNIT II: CHEMISTRY OF ORGANOMETALLIC COMPOUNDS (15 hrs)**

Introduction - Preparation, properties uses of Organomagnesium, Organozinc, Organolithium, Organocopper, Organolead, Organophosphorus and Organoboron compounds. Preparation, properties, uses and structure of ferrocene- Preparation and uses of Ziegler-Natta catalyst.

**UNIT III: NUCLEAR CHEMISTRY (15hrs)**

Introduction - composition of nucleus - nuclear binding energies –structure of nucleus- nuclear shell model and liquid drop model - magic numbers - nuclear stability - theories of nuclear stability - nuclear binding energy theory - meson theory of nuclear forces - nuclear fluid theory - isotopes, isobars, isotones, nuclear isomers and mirror nuclei - detection of isotopes –Aston’s mass spectrograph separation of isotopes - electromagnetic method - the whole number rule and packing fraction.

**UNIT IV: RADIOACTIVITY (15 hrs)**

Radioactive Emanations, Alpha rays, Beta rays and Gamma rays. The Disintegration theory- Group Displacement Law. Rate of disintegration and Half-life period. Radioactive disintegration series. The Gieger- Nuttal rule - Artificial radioactivity. Induced radioactivity. Nuclear fission-Atom bomb, Nuclear fusion-hydrogen bomb- Stellar energy - Hazards of radiation. Applications of Radioisotopes. Radiocarbon dating.

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**UNIT V: SOME SPECIAL TYPE OF COMPOUNDS**

**(15 hrs)**

Clathrates - examples and structures, interstitial and non-stoichiometric compounds –composition, manufacture, structure, properties and uses of phosphazenes –composition and uses of beryl, asbestos, talc, mica, zeolites and ultramarines.

**TEXT BOOK**

1. Puri, B.R., Sharma L.R. and Kalia K.C., Principles of Inorganic Chemistry, 30<sup>th</sup> ed., Mile stone publishers and distributors, 2009.

**BOOKS FOR REFERENCE**

1. Lee J.D., Concise Inorganic Chemistry. 5th ed., Blackwell Science, 2005.
2. Sharpe Alan G. Inorganic Chemistry. ELBS and Longman, 1981.
3. Miessler G. L. and Donald, A. Tarr, Inorganic Chemistry 4<sup>th</sup> ed., Pearson, 2010.
4. Malik, Wahid U., Tuli G.D. and Madan R.D., Selected Topics in Inorganic Chemistry, 7<sup>th</sup> ed., S.Chand & Company Ltd., 2007.
5. Gurdeep Raj Chatwal and Harish Mehre, Advanced Inorganic Chemistry, 7<sup>th</sup> ed., Goel Publishing House, Meerut