

UNIVERSITY OF MYSORE

Choice-Based Credit System & Continuous Assessment and Grading Pattern (CBCS-CAGP)

SYLLABUS

For

M.Sc. Polymer Science Course Entrance

DEPARTMENT OF POLYMER SCIENCE
SIR M.VISVESVARAYA POST-GRADUATE CENTRE
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2013-2014

Syllabus for M.Sc. Polymer Science Entrance Examination

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Eligibility for admission to M.Sc. in Polymer Science:

► B.Sc. degree with Chemistry/Polymer Chemistry as one of the subject with a minimum of 45% marks in Chemistry/Polymer Chemistry for General Merit (GM) candidates and 40% for SC/ST candidates.

Syllabus

Unit 1: History of macromolecular science, Importance of monomers and polymers, Basic Concepts, Nomenclature of polymers, Intermolecular forces and chemical bonding in polymers. **Classification:** addition polymerization, condensation polymerization.

Polymerisation mechanisms .

Unit 2: Techniques of Polymerisation: bulk, solution, suspension, emulsion. Co-ordination polymerisation, Ring-opening polymerization, Co-polymerisation. Importance of molecular weight in polymers, Molecular weight distribution, Control of molecular weight and their determination.

Unit 3: Bonding in Organic molecules – Hybridisation, sigma, pi and conjugated bonds, Taking Ethane, Ethene, Ethyne. Butadiene and benzene

as examples. Bond energy, bond length and bond angles. Concept of Resonance, Resonance energy.

Unit 4 : Stereochemistry : Chiral concepts, D,L; R,S Nomenclature, Geometrical isomers : E AND Z Nomenclatures. Classification of Organic reagents and reactions: Nucleophiles, electrophiles, nucleophilicity and electrophilicity. Mechanism of SN1 and SN2 Reactions. Carbonium ions, carbanions and free radicals : formation and stability.

Unit 5: Addition to carbon carbon double bonds, Catalytic Hydrogenation, Name reactions like Aldol condensation, Claisen condensation, Grignard reaction, Beckmann rearrangement.

Unit 6: Thermodynamics : Laws of Thermodynamics, Spontaneous and non-spontaneous reactions, Gibbs free energy, Relation between entropy and thermodynamic probability. Partition functions, Partial molar quantities: Partial molar volume, Partial molar free energy. Thermodynamics of dilute ideal and non-ideal solutions.

Unit 7 : Chemical kinetics : Transition state theory. Reaction in solution: collision theory and transition state theory, Salt effects. Effect of pressure and dielectric constant on reaction rates. Electro chemistry: Debye-Huckel theory of strong electrolytes, Onsager equation, Debye-Huckel limiting equation for activity coefficient, electrical double layer, electro capillary and electro kinetics phenomena.

Unit 8 : Chemical bonding in inorganic compounds, Coordination compounds, catalysis, aqueous and non aqueous solutions, s,p,d, molecular orbitals and their shapes. Heisenberg uncertainty principle Atomic orbitals, Schrodinger wave equations, Quantum numbers, Aufbau and Pauli Exclusion Principle, Hund's multiplicity rule, electronic configuration of the elements. Atomic and ionic radii, ionization energy, electron affinity and electro negativity.

Unit 9: Chromatography : General Terms and parameter used in chromatography, classification of chromatographic methods. Stationary and mobile phases- nature of adsorbents, factors influencing the adsorbents, nature and types of mobile phases. Column chromatography and thin layer chromatography : principle and applications

Unit 10:Need for testing ,standard and specifications. National and international standards, Quality control, accuracy and validity of best methods.

Recycling and biodegradability methods

References

Chemical kinetics- K.J.Laidler

Thermodynamics-Kuriacose and Rajaram

Thermodynamics –S. Glasstone

Advanced Inorganic Chemistry by J.E. Huheey.

Advanced Inorganic Chemistry by F.A.Cotton and G.Wilkinson

Organic Chemistry- Morrison and Boyd(Prentice Hall)

Text Book of Polymer Science – Bill Meyer(Wiley Inter Science Publishers)

Polymer Science – V.R.Gowarikar