NPTEL Video Course - Chemical Engineering - NOC:Introduction to Polymer Physics (IIT-R)

Subject Co-ordinator - Prof. Prateek Kumar Jha

Co-ordinating Institute - IIT - Roorkee

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to the course, Macromolecules and Life, Molecular flexibility
Lecture 2 - Classification of polymers, Types of polymerization, Average molecular weights and polydispersity
Lecture 3 - Motivation to study polymer physics
Lecture 4 - Random Walk Models of Single Chain I
Lecture 5 - Random Walk Models of Single Chain II
Lecture 6 - Random Walk Models of Single Chain III
Lecture 7 - Models of semiflexible chains (Kratky Porod Model) - Part I
Lecture 8 - Models of semiflexible chains (Kratky Porod Model) - Part II
Lecture 9 - Probability density of an ideal chain - Part I
Lecture 10 - Probability density of an ideal chain - Part II
Lecture 11 - Entropic Elasticity, Bead-Spring Model, Simulations of random walk models
Lecture 12 - Derivation of Diffusion equation, Einstein notation
Lecture 13 - Definition of Radius of gyration
Lecture 14 - Radius of gyration for an ideal chain, concept of ideality
Lecture 15 - Nonbonded interactions, hydrophobic and hydrophilic behaviour
Lecture 16 - Definition of excluded volume; good, bad, and theta solvent
Lecture 17 - Virial expansion, Flory theory for good solvent
Lecture 18 - Flory theory for bad solvent, self-similarity and fractal nature of polymers
Lecture 19 - Derivation of fractal dimension, concentration regimes and overlap concentration
Lecture 20 - Size, shape, and structure. Gyration tensor and measures of asphericity.
Lecture 21 - Order-disorder transition
Lecture 22 - Scattering experiments, Pair correlation function
Lecture 23 - Structure of polymer chain, Introduction to Monte Carlo simulations of polymer chains
Lecture 24 - Monte Carlo algorithm
Lecture 25 - Practical aspects of Monte Carlo simulation
Lecture 26 - Molecular Dynamics Simulations, Review of Thermodynamics
Lecture 27 - Solution Thermodynamics - I
Lecture 28 - Solution Thermodynamics - II
Lecture 29 - Solution Thermodynamics - III