ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc. (H) Chem						
Semester	**Course Code**	**Course Title**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Credit (C)**
VI	CBCS CHEMISTRY –DSE-6 32177906	Polymer Chemistry	2	0	0	2
Teacher/Instructor(s)		Dr. Preeti Chaudhary (sharing with Dr. Anjali Verma)				
Session		2021-2022				

Course Objective:

The primary objective of this paper is to help the student to know about the synthesis, properties and applications of polymers.

Course Learning Outcomes:

By the end of this course, students will be able to:
• Know about history of polymeric materials and their classification
• Learn about different mechanisms of polymerization and polymerization techniques
• Evaluate kinetic chain length of polymers based on their mechanism
• Differentiate between polymers and copolymers
• Learn about different methods of finding out average molecular weight of polymers
• Differentiate between glass transition temperature (Tg) and crystalline melting point (Tm)
• Determine Tg and Tm
• Know about solid and solution properties of polymers
• Learn properties and applications of various useful polymers in our daily life.

Course Description

Unit 4:
Determination of molecular weight of polymers (Mn, Mw, etc.) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index
Polymer Solution
Criteria for polymer solubility and Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy and free energy change of mixing of polymers solutions.
Polymer Degradation
Thermal, oxidative, hydrolytic and photodegradation
Unit 5:
Properties of Polymers (Physical, thermal, Flow & Mechanical Properties) Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride) and related polymers, poly(vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novolac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers: polyacetylene, polyaniline, poly(p-phenylene sulphide, polypyrrole, polythiophene

Lesson Plan:

Unit No.	Learning Objective	Lecture No.	Topics to be covered
1.	**Unit 4**	1.	Introduction of molecular weight of polymers (Mn, Mw, etc.)
		2	Determination of molecular weight of polymers (Mn, Mw, etc.) by end group analysis
		3	Determination of molecular weight of polymers (Mn, Mw, etc.) by light scattering
		4	Determination of molecular weight of polymers (Mn, Mw, etc.) by osmotic pressure methods
		5	Determination of molecular weight of polymers (Mn, Mw, etc.) by viscometry.
		6	Molecular weight distribution and its significance. Poly-dispersity index
		7	Introduction of Polymer Solution
		8	Criteria for polymer solubility
		9	Solubility parameter
		10	Thermodynamics of polymer solutions
		11	Entropy change of mixing of polymers solutions
		12	Enthalpy change of mixing of polymers solutions
		13	Free energy change of mixing of polymers solutions
		14	Introduction of Polymer Degradation
		15	Polymer Degradation by Thermal, oxidative
		16	Polymer Degradation by hydrolytic and photodegradation

2.	**Unit 5: Properties of Polymers**	17	Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins
		18	Polystyrene and styrene copolymers
		19	Poly(vinyl chloride) and related polymers
		20	Poly(vinyl acetate) and related polymers, acrylic polymers
		21	Fluoro polymers, polyamides and related polymers.
		22	Phenol formaldehyde resins (Bakelite, Novolac)
		23	Polyurethanes, silicone polymers,
		24	Polydienes, Polycarbonates
		25	Conducting Polymers: polyacetylene, polyaniline, poly(p-phenylene sulphide)
		26	Polypyrrole, polythiophene

Suggested Books:

Sl. No.	Name of Authors/Books/Publishers
1	Carraher,C. E. Jr. (2013), Seymour's Polymer Chemistry, Marcel Dekker, Inc.
2	Odian, G. (2004), Principles of Polymerization, John Wiley.
3	Billmeyer, F.W. (1984),Text Book of Polymer Science, John Wiley.

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment		25
	• Quiz/Viva		
	• Observation & Record		
	• Attendance		
	• Model Exam		
2.	End Semester Examination	3 hr	75