

POLYMER CHEMISTRY

Semester	Subject Code	Category	Lecture Hours		Theory hours		Practical hours		Credits
			Per week	Per sem.	Per week	Per sem.	Per week	Per sem.	
V	21SCH5A	Skill based-III	2	30	2	30	-	-	2

COURSE OBJECTIVES:

The students will be able to

- Impart knowledge about the types of polymers, polymerisation techniques, commercial polymers and applications of polymers in our daily life.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Learn about the polymers, their classification and the types of polymerisation.	K2
CO2	Learn about different methods of finding out average molecular weight of polymers and glass transition temperature (T _g).	K4
CO3	Learn about different polymerisation techniques and the polymer processing.	K2
CO4	Learn about the properties and applications of various useful polymers in our daily life.	K3
CO5	Learn about rubber and the bio-applications of polymers.	K3

*CO – Course Outcomes

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze.

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	S	M	S
CO2	S	M	S	S	M	S
CO3	S	M	S	S	M	S
CO4	S	M	M	S	M	S
CO5	S	M	M	S	M	S

(S – Strong; M – Medium; L – Low)

UNIT-I: Introduction to Polymer Chemistry**6 Hours**

- 1.1 Polymers – Definition – Monomer – Definition – Degree of polymerisation – Natural and Synthetic polymers – Classification of polymers on the basis of structure and applications – Thermoplastics and Thermosetting polymers – Definition, examples and differences.
- 1.2 Types of polymerisation – Addition polymerisation, condensation polymerisation and copolymerisation – Definition with example – Differences between addition polymerisation and condensation polymerisation.

UNIT-II: Properties of Polymers**6 Hours**

- 2.1 Glass transition temperature (T_g)– Parameters influencing T_g value – Crystallinity, molecular weight, branching and cross linking, plasticisers, stereo-regularity and side group.
- 2.2 Tacticity or stereospecific polymers – Isotactic polymer, syndiotactic polymer and atactic polymer– Molecular weight of polymers– Number average molecular weight, weight average molecular weight and polydispersity index (PDI).

UNIT-III: Techniques of Polymerisation**6 Hours**

- 3.1 Polymerisation techniques – Bulk or block polymerisation, solution polymerisation, suspension or pearl polymerisation and emulsion polymerisation.
- 3.2 Polymer processing - Calendaring, die casting and rotational casting – Reactions – Hydrolysis, hydrogenation, addition, substitution and cyclisation.

UNIT-IV: Commercial Polymers**6 Hours**

- 4.1 General methods of preparation and uses of the following – Teflon, polyethylene, polystyrene, polyesters, polyamides, polycarbonates and PVC.
- 4.2 Textile fibers – Definition and polymer requirement for fibers – Polyamides – Nylon-6,6 – Polyesters – Terylene – Cellulose acetate – Viscose rayon.

UNIT-V: Advances in Polymers**6 Hours**

- 5.1 Rubber – Elastomers – Natural Rubber – Isoprene – Synthetic Rubber – Neoprene – Applications – Vulcanisation – Polyurethane and Silicone Rubber – Applications.
- 5.2 Advances in Polymers – Biopolymers, biomaterials, polymers in medical field – High temperature and fire-resistant polymers – Silicones – Applications.

Demonstration experiments:

- IR studies of polymers.
- Comparison of thermoplastic and thermosetting polymers
- Making polymer bouncy balls and comparing.

TEXT BOOKS:

S. No.	Authors	Title	Publishers	Year of publication
1.	S. S. Dara, A. K. Singh and Abhilasha Asthana	Basic Engineering Chemistry	S. Chand and Company Ltd, New Delhi.	2008
2.	S. Dara	A Textbook in Engineering Chemistry	S. Chand and Company Ltd, New Delhi.	1992

REFERENCE BOOKS:

S. No.	Authors	Title	Publishers	Year of publication
1.	Fred. W. Billmeyer, JR	Textbook of Polymer Science	John Wiley & Sons (Asia), PTE Ltd	2008
2.	V. R. Gowarikar, N. V. Viswanathan and Jayadev Sreedhar	Polymer Science	New Age International (P) Ltd.	2005
3.	B. K. Sharma	Polymer Chemistry	Goel Publishing House	1989
4.	M. G. Arora and M. S. Yadav	Polymer Chemistry	Anmol Publications	1998
5.	M. P. Stevens	Polymer Chemistry - An Introduction	Oxford University Press	1990
6.	R. B. Seymour	Introduction to Polymer Chemistry	McGraw Hill Publishing Company	1971

TEACHING METHODOLOGY:

- Conventional chalk and board teaching
- Power Point Presentations
- Assignments
- Animated videos
- Chalk and Board
- Interactive sessions
- To get recent information through the internet.
- Engaging students in cooperative learning.
- Learning through quiz design.

SYLLABUS DESIGNER:

Dr. S. Sashikala, Assistant Professor of Chemistry.