



Established by Tribal Development Department, Govt. of Gujarat

B.Sc. (Chemistry) Programme

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
-	-	2	2	-	25	-	25

Programme Name	B.Sc.
Semester	V
Course Code	BS05SECHE2
Course Title	Polymer Chemistry
Course Content Type (Th./Pr.)	Practicals
Course Credit	2
Sessions+ Lab. Per Week	4
Total Teaching/Lab. Hours	30 Hours
* 2 Laboratory = 1 Session	

Learning Objectives

1. Learn how formaldehyde undergoes addition reactions
2. Differentiate between acidic and basic conditions. Observe how an excess of phenol with an acid catalyst yields Novolak (a linear, thermoplastic resin), while an excess of formaldehyde with a base catalyst yields Resol.
3. Learn how Novolac requires the addition of a curing agent like hexamethylenetetramine to fully cross-link and cure into a rigid plastic.
4. Learn the laboratory techniques required to quantify the active aldehyde content in a commercial formalin solution.
5. Learn how to utilize redox titrations (often employing the sodium bisulfite addition method or the alkaline peroxide method) to determine the percent purity.

Prerequisites (if any)

Learning Outcomes

On the completion of this course, students will able to:

1. Understand Step-Growth Polymerization.
2. Distinguish the structural differences between linear, fusible Novalaks (acid-catalyzed, excess phenol) and highly crosslinked Resoles (base-catalyzed, excess formaldehyde).



बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

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School of Science B.Sc. (Chemistry) Programme

3. Differentiate the behavior of crosslinked thermosetting resins versus thermoplastic linear polymers.
4. Apply chemical formulas and stoichiometry to find the active formaldehyde content and understand how impurities affect the yield and curing times of resulting resins.

Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I and II	1) Synthesis of Polymers and resins like Novalak Phenol Formaldehyde 2) Resol Phenol formaldehyde, 3) Urea Formaldehyde 4) Malamine formaldehyde, 5) Glyptal Resin, Saturated and Unsaturated Polyester, 6) Cellulose acetate, Cellulose Nitrate, 7) determination of % Purity of formaline, 8) Phenol-formaldehyde resin (Ammonia catalyst) 9) Phenol-formaldehyde resin (Acid catalyst) 10) Urea-formaldehyde resin	30
Text Book(s)		
1.		
Reference Books		
1. Polymer Science by V. R Gowariker, N. V. Viswanathan, Jayadev Sreedhar, Wiley Eastern. (New Age International (P) Ltd., New Delhi) 2. Polymer Science and Technology of Plastics and Rubbers by Premamoy Ghosh(Tata McGraw-Hill Publishing Co. Ltd., New Delhi) 3. Polymer Science and Technology, by Joel R Fried, PHI.		
Web Resources		
1. Google books, INFLIBNET, Google Web		
Required Software(s) (if any)		
Practical(s) (if any)		

L:: Lecture, T:: Tutorial , P::Practical

CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation