



**DEPARTMENT OF CHEMISTRY**  
**MUHAMMED ABDURAHIMAN MEMORIAL**  
**ORPHANAGE (MAMO) COLLEGE**

[Govt. Aided First Grade College & Affiliated to University of Calicut.  
Re-Accredited by NAAC with A Grade]

**CURRICULUM FOR CERTIFICATE COURSE**  
**CERCH006: BASIC CONCEPT IN**  
**POLYMER CHEMISTRY**

**OFFERED DURING THE**  
**ACADEMIC YEAR 2019-20**  
**[APPROVED BY ACADEMIC COMMITTEE, MAMO COLLEGE]**



MANASSERY, MUKKAM POST,  
KOZHIKODE, KERALA, INDIA, 673 602.  
EMAIL: MAMOCOLLEGE@GMAIL.COM



OFFICE: 0495-2297319  
PRINCIPAL: 0495-2295121



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## DEPARTMENT OF CHEMISTRY

### CURRICULUM FOR CERTIFICATE COURSE - CERCH006

CONTENTS		
1	INSTITUTIONAL VISION, MISSION & OBJECTIVES	3
2.	VISION, MISSION, OBJECTIVES & CORE VALUES OF THE DEPARTMENT	4
3.	B.Sc POLYMER CHEMISTRY: PEOs	5
4.	B.Sc POLYMER CHEMISTRY: PSOs	6
5.	B.Sc POLYMER CHEMISTRY: POs	7
6.	CERCH006: COURSE CURRICULUM	9
6.1.	COURSE LEVEL	10
6.2.	PREREQUISITE	10
6.3.	COURSE INTAKE & ADMISSION	10
6.4.	COURSE COORDINATOR	10
6.5.	COURSE PREAMBLE	10
6.6.	DURATION	10
6.7.	CURRICULUM FOCUS	10
6.8.	COURSE OBJECTIVES	11
6.9.	SKILL EXPECTED	11
6.10.	COURSE OUTCOMES	11
6.11.	MAPPING OF COs WITH POs AND PSOs	12
6.12.	MODULE-WISE COURSE CONTENTS	12
6.13.	DELIVERY MODE	13
6.14.	DELIVERY SCHEDULE	13
6.15.	DETAILED COURSE DELIVERY PLAN	13
6.16.	ASSESSMENT COMPONENTS	16
6.17.	COURSE EVALUATION & GRADING	16
6.18.	GRIEVANCE REDRESSAL	17
6.19.	ISSUANCE OF CERTIFICATES	17



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## INSTITUTIONAL VISION, MISSION & OBJECTIVES 01



VISION

**VISION:** Build Scientifically Oriented, Intellectually Accomplished, Morally Upright and Socially Committed youth who can play a constructive role in Nation Building.



MISSION

**MISSION:** Intellectual, social and economic empowerment of the youth in general and women, minorities, orphans and the destitute in particular by providing quality, value-based higher-education.



OBJECTIVES

**OBJECTIVES:** Pursuit of Excellence, Harnessing technology, Thrust on value-based education, Nurturing Excellence and Moulding the youth for Nation Building



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## VISION, MISSION, OBJECTIVES & CORE VALUES OF THE DEPARTMENT **02**



VISION

**VISION:** To be a recognized model for educating students, prepared to compete in and contribute to the ever-changing, technology-centred world.



MISSION

**MISSION:** To encourage in the broadest and most liberal manner towards the advances in Chemistry through education by providing students with quality education.



**OBJECTIVES:** (a) To provide a broad foundation in Chemistry that stresses scientific reasoning and analytical problem solving with molecular perspective. (b) To provide students with skills required to perform laboratory experiments and data analysis. (c) Provide programmes that meet the educational and technical demands of the sub-disciplines. (d) Value-based training for ethical Conscience. (e) Inculcate critical and analytical thinking. (f) Apply fundamental chemical principles to gather and explain data.



VALUES

**CORE VALUES:** Innovation, Excellence, Ethical Consciousness, Service Mindedness, Professionalism and Global Outlook.



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## B.Sc. POLYMER CHEMISTRY: PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) 03

After 4 to 5 years of graduation, the career and professional accomplishments attained by the B.Sc Polymer Chemistry Graduates would reflect that the programme really prepared the graduates to deal with the real world, where they could apply and use the skills and knowledge they have learned to good use.

Specifically, the graduate would be able to:



**PEO1:** Acquire the fundamental principles of Science and Chemistry with modern experimental and computational skills.



**PEO2:** Ability to handle problems of practical relevance to society while complying with economical, ethical and safety factors.



**PEO3:** Demonstrate professional excellence, ethics, soft skills and leadership qualities.



**PEO4:** Have sufficient breadth of understanding to enable continued professional development and lifelong learning throughout their career.



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# B.Sc POLYMER CHEMISTRY: PROGRAMME SPECIFIC OUTCOME (PSOs) 04

On successful completion of a Bachelor Degree in Polymer Chemistry, the graduates would be able to:

-  **PSO1:** Gain the knowledge of Chemistry through theory and hands-on training.
-  **PSO2:** To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.
-  **PSO3:** To familiarize with the emerging areas of Chemistry and their applications and to apprise the students of its relevance in future studies.
-  **PSO4:** Understand good laboratory practices and safety.
-  **PSO5:** To be conversant with the applications of Chemistry in day-to-day life.



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# B.Sc POLYMER CHEMISTRY: PROGRAMME OUTCOMES (POs) 05

The students graduating from B.Sc Polymer Chemistry Programme should be able to:



**PO1:** Demonstrate, solve and an understanding of major concepts in all Disciplines of chemistry problems.



**PO2:** Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.



**PO3:** Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.



**PO4:** Find out the green route for chemical reaction for sustainable development.



**PO5:** To inculcate the scientific temperament in the students and outside the scientific community.



**PO6:** Use modern techniques, recent equipment and software for leaning Chemistry.



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**PO7:** To demonstrate professional and ethical attitude with enormous responsibility to serve the society.



**PO8:** To apply contextual knowledge and modern tools of chemistry research for solving problems.



**PO9:** An understanding of professional, ethical, legal, security, social issues and responsibility.



**PO10:** Be acquainted with the contemporary issues latest trends in technological development and thereby innovate new ideas and solutions to existing problems.



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## CERTIFICATE COURSE

# CERCH006: BASIC CONCEPT IN POLYMER CHEMISTRY **06**

## COURSE CURRICULUM

Course Name	Basic Concept in Polymer Chemistry
Course Code	CERCH006
Year	2019-20
Course Designer	Ms. Saranya E. P
Course Duration	30 Hrs
Course Schedule	June to September
Maximum Students Intake	60 Students



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#### 1. COURSE LEVEL

Fundamental, skill-oriented certificate/vocational programme.

#### 2. PREREQUISITE

None.

#### 3. COURSE INTAKE & ADMISSION

Maximum 60 students will be given admission to the course based on First-Come-First-Serve basis. All the students of the MAMO College are eligible for free enrolment for the course. The enrolment notification will be issued for the course well in advance of the commencement of the course.

#### 4. COURSE COORDINATOR

Ms. Saranya E. P, Assistant Professor, Department of Chemistry

#### 5. COURSE PREAMBLE

Polymer science can be applied to save energy and improve renewable energy technologies. It include the conversion of natural and synthetic raw materials in to products that include plastic, rubber, etc.

#### 6. DURATION

Total Duration: 30 Hrs. [Contact Hrs. 16 Hrs., Course Woks: 7 and Assessment Works: 7]

#### 7. CURRICULUM FOCUS

Enhance the employability of the learners through curriculum enrichment for additional skill development.



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## 8. COURSE OBJECTIVES

Learners are expected to

- (a) Understand the polymers used in real life.
- (b) Acquire an idea about variety of polymers.

## 9. SKILL EXPECTED

On the successful completion of the course, learners will be able to:

- (a) Develop an idea about how smaller building block combine to form polymers
- (b) Applying basic idea to manipulate the molecular structure logically.
- (c) Creating new bulk molecules from smaller ones.

## 10. COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to:

CO No	Course Outcome(CO)	Skill/Knowledge Attainment Level Based on Revised Bloom's Taxonomy
CO1	Explain polymer monomer and polymerisation	Understand
CO2	Implement the basic idea to develop bulk molecules from monomers	Apply
CO3	Compare different polymers from monomers	Analyze
CO4	Design the preparation methods of different polymers	Evaluate



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#### 11. MAPPING OF COs WITH PSO<sub>s</sub> AND PO<sub>s</sub>

CO <sub>s</sub>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	0	0	1	0	1	1	0	0	3	2	1	1	1
CO2	2	1	0	0	1	2	0	1	0	1	3	1	1	1	1
CO3	1	1	0	0	1	0	0	1	0	0	1	2	0	0	1
CO4	2	3	1	1	2	1	0	1	1	1	1	2	2	1	1
AVG	2.0	1.5	0.3	0.3	1.3	0.8	0.3	1.0	0.3	0.5	2.0	1.8	1.0	0.8	1.0

#### 12. MODULE-WISE COURSE CONTENTS

##### MODULE 1: INTRODUCTION

**MODULE DURATION:** 15 Hrs. [Contact Hrs. 8 Hrs, Course Woks: 3 and Assessment Works: 4]

**MODULE CONTENT:** Polymers and macromolecules-Homo, hetero and copolymers-Classification-Natural and synthetic polymers-linear-branched and cross linked polymers-thermoplastic and thermosetting plastic-addition and condensation polymers

##### MODULE 2: TYPES OF POLYMERISATION AND POLYMETISATION TECHNIQUES

**MODULE DURATION:** 15 Hrs. [Contact Hrs. 8 Hrs, Course Woks: 4 and Assessment Works: 3]

**MODULE CONTENT:** Types of polymerisation Chain polymerisation-free radical polymerisation ionic and coordination polymerisation, step growth polymerisation-polycondensation- Polymerisation technique Bulk, solution, suspension, Emulsion, melt condensation and interfacial polymerisation technique.



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#### REFERENCES

1. F. W. Billmeyer Jr., *Textbook of Polymer Science*, John Wiley and Sons, New Delhi, 2007.
2. V. R. Gowarikar, *Polymer Chemistry*, New Age International Pvt. Ltd., New Delhi, 2010
3. George Odian, *Principles of Polymerization*, 4th Edn., Wiley, 2004
4. B. K. Sharma, *Polymer Chemistry*, Goel Publishing House, Meerut, 1989.
5. M. G. Arora, M. Singh, M. S. Yadav, *Polymer Chemistry*, 2nd Revised Edition, Anmol Publications Private Ltd., New Delhi, 1989.

#### FURTHER READING

6. K. J. Saunders, *Organic Polymer Chemistry*, 2nd Edn., Chapman and Hall, London, 1988.
7. Gowri Sankar Misra, *Introductory Polymer Chemistry*, New Age International, New Delhi, 1993.

### 13. DELIVERY MODE

The course employs multi-mode delivery mechanism including contact lecture, online videos, and online and offline course works.

### 14. DELIVERY SCHEDULE

June to September.

### 15. DETAILED COURSE DELIVERY PLAN

Hour	Delivery Mode and Activity	Topics to be Covered
1	Contact Hour - 1: Classroom Discussion	Introducing the Course



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Hour	Delivery Mode and Activity	Topics to be Covered
2	Contact Hour - 2: Classroom Interaction	Introduction to Polymers: Micro & Macro world, History of Polymers, Different types of polymers
3	Assessment Hour – 1	Quiz using Kahoot
4	Contact Hour - 3: Classroom Lecture	Homo, hetero and copolymers
5	Contact Hour - 4: Classroom Lecture	Natural and synthetic polymers
6	Course Work – 1: Course Assignment	Assignment on Differentiate day to day life polymers in to Natural & synthetic.
7	Assessment Hour – 2	Quiz competition by making teams
8	Contact Hour - 5: Classroom Discussion	Linear-branched and cross linked polymers
9	Contact Hour - 6: Classroom Demonstration	Thermoplastic and thermosetting plastic
10	Assessment Hour – 3	Q & A session (Oral)
11	Contact Hour - 7: Classroom Demonstration	Addition and condensation polymers
12	Course Work – 2: Course Assignment	Google form quiz on different types of Polymers.
13	Contact Hour - 8: Classroom Discussion	Introduction to Polymerisation mechanisms, Chain polymerisation
14	Course Work – 3: Course Assignment	Crossword play
15	Assessment Hour - 4	Test Paper on Module 1
16	Contact Hour - 9: Classroom Demonstration	Free radical polymerisation



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Hour	Delivery Mode and Activity	Topics to be Covered
17	Contact Hour - 10: Classroom Demonstration	Ionic and Coordination polymerisation
18	Course Work – 4: Course Assignment	Q &A (Oral)
19	Contact Hour - 11: Classroom Discussion	Step growth polymerisation- polycondensation
20	Contact Hour - 12: Classroom Lecture	Polymerisation techniques: Bulk Polymerisation
21	Course Work – 5: Course Assignment	Quiz
22	Contact Hour - 13: Classroom Lecture	Solution & Suspension Polymerisation
23	Assessment Hour - 5	Quiz using google form
24	Contact Hour - 14: Classroom Discussion	Emulsion & melt Polymerisation
25	Course Work – 6: Course Assignment	Assignment on different types of Polymerisation Mechanism
26	Contact Hour - 15: Classroom Discussion	Condensation and Interfacial polymerisation
27	Contact Hour - 16: Classroom Interaction	Sum up of Module 1 & 2
28	Course Work – 7: Course Assignment	Assignment on different types of Polymerisation Techniques
29	Assessment Hour - 6	Course End Assessment
30	Assessment Hour - 7	Course End Assessment



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## 16. ASSESSMENT COMPONENTS

Total Marks: 100

**CLASSROOM AND GROUP PARTICIPATION: 20 Marks.** This component aims at testing the course content understanding and the reflection skills and their attainment levels.

**COURSE WORK: 30 Marks.** This component aims at testing the skill attainment levels of the learners in analysing and implementing the real-world problem.

**MID-COURSE ASSIGNMENT: 20 Marks.** This component aims at testing the module-wise attainment levels of the course objectives and course outcome and module outcomes.

**END-COURSE ASSESSMENT: 30 Marks.** This component aims at testing overall attainment levels of the course with respect to course objectives, course outcome and module outcomes.

## 17. COURSE EVALUATION & GRADING

The course evaluation is done/coordinated entirely by the course coordinator. The following 10-point Indirect Grading System is used for awarding grades to students:

Percentage of Mark	Letter Grade	Interpretation	Class
95 and above	O	Outstanding	First Class with Distinction
85 to below 95	A+	Excellent	First Class with Distinction
75 to below 85	A	Very good	First Class with Distinction
65 to below 75	B+	Good	First Class
55 to below 65	B	Satisfactory	First Class
45 to below 55	C	Average	Second Class



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35 to below 45	P	Pass	Third Class
Below 35	F	Failure	Fail
Incomplete	I	Incomplete	Fail
Absent	Ab	Absent	Fail

The grade is awarded by the course-coordinator by considering the overall performance of the learner in all the assessment component of the course.

## 18. GRIEVANCE REDRESSAL

The grievances, if any, can be submitted to the Head of the Department for its redressal. Those grievances that cannot be redressed by HoD can be forwarded to Academic Council of the College for final decision on the matter.

## 19. ISSUANCE OF CERTIFICATES

The Course Completion Certificate will be issued to all the successful candidates showing the Total Marks and Grade Obtained.



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P.O. MANASSERY, MUKKAM - 673602