

CH967-10 Polymer Synthesis

26/27

Department

Chemistry

Level

Taught Postgraduate Level

Module leader

David Haddleton

Credit value

10

Module duration

10 weeks

Assessment

100% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module aims to provide a detailed overview of the fundamental considerations and hypotheses of polymer chemistry ensuring that all students have a suitable background knowledge of the major synthetic methods and mechanisms as well as appropriate physical chemistry knowledge to excel in the more advanced aspects of the course. The material will focus on highlighting the importance of advanced polymer structures as well as comprehensive teaching of the all applicable polymer synthesis techniques.

[Module web page](#)

Module aims

This module aims to provide a detailed overview of the fundamental considerations and hypotheses of polymer chemistry ensuring that all students have a suitable background knowledge of the major synthetic methods and mechanisms as well as appropriate physical chemistry knowledge to excel in the more advanced aspects of the course. The material will focus on highlighting the importance of advanced polymer structures as well as comprehensive teaching of the all applicable polymer synthesis techniques.

Topics covered include: history of polymers and polymerization, terminology in polymer synthesis and characterization techniques, free radical polymerization including the kinetics, statistical

copolymers and heterogeneous polymerization, step growth polymerization mechanisms, living polymerization techniques including ionic and radical polymerization techniques, and Ziegler-Natta polymerizations.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction Lecture

Free Radical: Introduction/Emulsion polymerisation

Free Radical: Copolymers

Anionic & Cationic Living Polymerization

Condensation Polymerisation

Polymer Analysis, GPC/NMR

Ring opening polymerisation/biodegradable polymers

Ziegler Natta/ROMP

Metal mediated radical (ATRP/CCTP) polymerisation

RAFT/ Nitroxide mediated polymerisation

Learning outcomes

By the end of the module, students should be able to:

- Show an advanced knowledge of the technical terminology and definitions in polymer science.
- Show a comprehensive understanding of the fundamental polymerization techniques.
- Understand the detailed mechanism and kinetics of radical polymerization and discriminate between controlled/living polymerization techniques.
- Understand the hypotheses, kinetics and mechanism of step-growth polymerizations and Ziegler-Natta catalyzed reactions.
- Demonstrate the ability of practically synthesizing and characterizing a typical polymer.
- Be able to select appropriate polymerization methods to solve synthetic challenges

Indicative reading list

[Reading lists can be found in Talis](#)

Subject specific skills

Key Skills:

Communicate verbally and in writing

Demonstrate advanced polymer synthesis and characterization practical skills

Demonstrate conceptual understanding of different advanced polymer synthesis techniques

Demonstrate the ability to perform a literature search and to critically evaluate the results of experiments

Effectively manage their time

Cognitive Skills:

Critically analyze data

Comprehensively assess errors in data

Test hypotheses using experimental data

Interpret results using information from the literature.

Assimilate information from written material such as text books and research papers

Transferable skills

Ability to participate in group discussions

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (30%)
Private study	70 hours (70%)
Total	100 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group B6

Assessment component	Weighting	Study time	Eligible for self-certification
Written Examination (Locally Held) A 2-hour written exam.	100%		No

Weighting Study time Eligible for self-certification

Reassessment component is the same

Feedback on assessment

Written feedback on assessed exam paper will be provided.

[Past exam papers for CH967](#)

Availability

Courses

This module is Core for:

- Year 1 of TCHA-F1PX Postgraduate Taught Analytical and Polymer Science
- Year 1 of TCHS-F1PK Postgraduate Taught Polymer Chemistry
- Year 1 of TCHA-F1PW Postgraduate Taught Polymer Science