

Oral Qualifying Exam - Polymer Synthesis

This exam focuses on the synthesis of macromolecules. Because molecular weight and molecular weight distributions of polymers are important and are generally regulated through synthetic methods, knowledge of these topics will also comprise an essential part of the examination. Characterization methods for polymers as related to polymer synthesis will also be covered.

NON-EXHAUSTIVE TOPICAL AREAS

- Molecular weight and polymer solutions
- Chemical structure and polymer morphology
- Step-reaction and ring-opening polymerization
- Polyesters and Polyamides
- Polyethers, polysulfides, and related polymers
- Phenol-, urea-, and melamine-formaldehyde polymers
- Heterocyclic polymers
- Inorganic and partially inorganic polymers
- Free radical polymerization
- Ionic polymerization
- Vinyl polymerization with complex coordination catalysts
- Reactions of vinyl polymers
- Copolymers
- Biopolymers
- Dendrimers and hyperbranched polymers
- Macromolecular stereochemistry
- Characterization methods at the level required for a polymer chemist (GPC, NMR, Mass spectroscopy, FTIR, etc.)

LEVEL (BASED ON UIUC COURSES)

MSE 457/CHEM 480: Polymer Chemistry

RELATED UIUC COURSES

MSE 450: Intro Polymer Sci and Eng

MSE 452: Polymer Laboratory

SUGGESTED TEXTS

Stevens, M.P. Polymer Chemistry, Oxford: New York 1999

Odian, G. Principles of Polymerization, Third ed.; Wiley: New York, 1991.

Flory, P.J. Principles of Polymer Chemistry, University Press: Ithaca, 1953.

Painter, P.C.; Coleman, M.M. Fundamentals of Polymer Science, Technomic: Lancaster, PA, 1994.

Young, R.J.; Lovell, P.A. Introduction to Polymers, 2nd edition, 1991