

Chemistry 772 Course Outline

Polymerization and Polymer Reactions

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Course contents

1. Basics: Motivations for chemical modification of polymers. Differences vs. small molecules: Reactivity, extent of reaction in relation to chain structure and polymer morphology.
2. Historical aspects: Poly(vinyl esters) and derivatives, cellulose and derivatives. Chemical modification of rubbers and polyolefins, curing reactions.
3. Linear polystyrene and styrene-divinylbenzene resin derivatives: Preparation, uses as reactive polymers – catalysts, polymer-supported reagents, solid phase synthesis.
4. Biological applications: Immobilization of enzymes. Microencapsulation and controlled drug delivery.
5. Grafting reactions: Grafting from, grafting onto, grafting through approaches based on different polymerization techniques.
6. Applications in high technology: Self-assembly and patterning, optoelectronics, conducting and semiconducting polymers, nanotechnology.
7. Additional special topics (depending on time availability).

Evaluation

Midterm exam: 50%

Final exam: 50%

Prerequisites

CHEM 770 or equivalent (e.g., CHEM 370, ChE 542, ChE 640)

Texts in library (purchase *not* required)

“Principles of Polymerization” 4th ed., G. Odian, Wiley: New York, 2004. On reserve: QD281.P6O3 2004.

“Encyclopedia of Polymer Science and Engineering”, 2nd ed., H.F. Mark and J.I. Kroschwitz, Eds., Wiley: New York, 1985-1990. Reference section: TP 1087.E46 1985

Research article reprints made available as appropriate.

See also QD 381 and TA 455 sections in the library.