Universidade Estadual de Campinas
Faculdade de Engenharia Química
Coordenação de Pós-Graduação

Disciplina: IQ249-Propriedades Estado Sólido de Materiais Poliméricos I

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Período: 2 semestre de 2026

Estrutura: Theoretical lectures and/or guided studies.

Avaliação: Essay-based examinations, group assignments, and/or seminars.

Programa:

1. Introduction to Polymers

1.1. Molecular Structure
1.2. Intermolecular Forces
1.3. Functionality
1.4. Classification According to Structure
1.5. Configuration and Conformation of Polymeric Chains

2. Principles of Polymer Synthesis

2.1. Physical Arrangements in Polymerization Reactors
2.2. Addition Polymerization
2.3. Condensation Polymerization
2.4. Other Polymerization Techniques

3. Polymers in Solution

3.1. Basic Thermodynamics of Polymer Solubilization
3.2. Radius of Gyration
3.3. Θ Condition
3.4. Solubility Parameter

4. Molar Mass

4.1. Types of Molar Mass
4.2. Measurement Principles

5. Polymers in the Solid State

5.1. Morphology
5.2. Crystallinity
5.3. Factors Affecting Crystallinity

6. Thermal Behavior

6.1. Thermal Transitions
6.2. Factors Affecting Thermal Transitions
6.3. Crystallization
6.4. Melting

7. Mechanical Behavior

7.1. Elastic Modulus, Strength, Ductility, Toughness, Resilience, and Hardness
7.2. Deformation Mechanisms
7.3. Types of Fracture
7.4. Factors Affecting Mechanical Properties

8. Rheological Behavior

8.1. Viscoelasticity Models, Creep, and Stress Relaxation
8.2. Principles of Melt Rheology
8.3. Principles of Polymer Processing

9. Thermal Stability and Degradation

9.1. Thermal Degradation Reactions
9.2. Biodegradation

10. Principles of Physical Modification of Polymers

10.1. Additives
10.2. Composites
10.3. Blends

Referências:

Young, R. J.; Lovell, P. A. Introduction to Polymers. 3rd ed. Boca Raton: CRC Press, 2011.

Fried, J. R. Polymer Science and Technology. 3rd ed. Upper Saddle River: Pearson, 2014.

Odian, G. Principles of Polymerization. 4th ed. Hoboken: Wiley-Interscience, 2004.

Rubinstein, M.; Colby, R. H. Polymer Physics. Oxford: Oxford University Press, 2003.