



Universidade Federal de Santa Catarina
Centro Tecnológico
Departamento de Engenharia Química e
Engenharia de Alimentos



Programa de Pós-Graduação em Engenharia Química

PLANO DE ENSINO TRIMESTRE 2024.1

I. IDENTIFICAÇÃO DA DISCIPLINA

Código	Nome da disciplina	Créditos	Período
ENQ 410003	Emulsion and miniemulsion polymerization processes	3	2024_1

II. PROFESSOR MINISTRANTE

Claudia Sayer

III. TUTOR

N/A

IV. PRESENÇA NAS ATIVIDADES

Chamada nas aulas.

V. CURSO E PÚBLICO-ALVO

Mestrado/Doutorado em Engenharia Química

VI. EMENTA

Emulsion and miniemulsion polymerization processes are versatile processes for obtaining submicrometric polymeric particles with a variety of applications, ranging from latex for paper and cellulose to polymeric nanoparticles used for controlled release of drugs. The polymers obtained via emulsion and miniemulsion polymerization are products defined by the process, what means that their properties are determined during the polymerization process. The focus of this course is on the understanding of the fundamental mechanisms of emulsion and miniemulsion polymerization, what allows manipulating the process conditions in order to optimize the process and obtain new products with improved qualities.

VII. OBJETIVOS

The comprehension of the fundamental mechanisms of emulsion and miniemulsion polymerization, what allows to manipulate the process conditions in order to optimize the process and obtain new products with improved qualities.

VIII. CONTEÚDO PROGRAMÁTICO

- Characteristics and applications of the emulsion and miniemulsion polymerization processes.
- Kinetics of the emulsion and miniemulsion polymerization processes with the use of organic and inorganic initiators.
- Nucleation of polymer particles and particle size distribution.
- Stability of colloidal polymers.
- Particle morphology.
- Characterization of the polymeric latex.
- Emulsion and miniemulsion polymerization reactors.
- On-line monitoring of polymerization reactors.

IX. METODOLOGIA DE ENSINO / FORMA DE TRABALHO

Classroom lessons and synchronous activities

- Weekly classes, composed of short lectures followed by a discussion and either exercises, questionnaires and correction with discussion;
- Up to 20% of the course can be taken online, with synchronous classes (webconference RNP - the links will be made available previously in Moodle).

Asynchronous activities (Moodle)

Studying for classes, exercises.

X. METODOLOGIA DE AVALIAÇÃO

- Exercises and questionnaires (70%), to be solved by small groups during the classes (if a student misses one of these classes he will be able hand in until the next class);
- Final test (30%).

XI. CRONOGRAMA

- Lecture 1 – Introduction
- Lecture 2 – Kinetics of the emulsion polymerization processes with the use of organic and inorganic initiators – Part 1
- Lecture 3 – Kinetics of the emulsion polymerization processes with the use of organic and inorganic initiators – Part 2
- Lecture 4 – Kinetic measurements / Characterization of the polymeric latex
- Lecture 5 – Nucleation of polymer particles and particle size distribution.
- Lecture 6 – Stability of colloidal systems
- Lecture 7 – Miniemulsion polymerization – Part 1
- Lecture 8 – Miniemulsion polymerization – Part 2
- Lecture 9 – Particle morphology
- Lecture 10 – Emulsion and miniemulsion polymerization reactors
- Lecture 11 – On-line monitoring of polymerization reactors
- Lecture 12 – Final test

XII. BIBLIOGRAFIA

Selected research and review articles.

Books:

A. M. van Herk, Chemistry and Technology of Emulsion Polymerisation, Blackwell Publishing, Oxford (2005)

P. A. Lovell, M. El-Aasser, Emulsion Polymerization and Emulsion Polymers, J. Wiley & Sons, New York (1997)

R. G. Gilbert, Emulsion Polymerization, London, Academic Press (1995)

E-books:

Eliseeva, V. I.; Ivanchev, S. S.; Kuchanov, S. I.; Lebedev A. V. (1981) Emulsion Polymerization and Its Applications in Industry. Springer. <https://doi.org/10.1007/978-1-4684-1641-1>

Moawed, A. N. (2018) Emulsion Polymerization Mechanism. IntechOpen. <https://doi.org/10.5772/intechopen.72143>

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