

COURSE GUIDE

2021/22

Faculty

215 - Faculty of Chemistry

Cycle

Not Applicable

Degree

GQUIMI20 - Bachelor's Degree in Chemistry

Year

Fourth year

COURSE

26120 - Industrial Polymerisation Processes

Credits, ECTS:

6

COURSE DESCRIPTION

The main objective of the subject is that the student acquires knowledge of the polymerization reaction engineering, so that he/she can understand the production processes of main commercial polymer families (polyolefins, PVC, styrene/acrylic copolymers, vinyl/acrylic copolymers or PET amongst others). For that purpose, the polymerization kinetics, polymerization techniques, different kinds of processes and reactors used and the properties of the polymers and copolymers produced will be discussed.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The following cross skills will be developed:

M03CM17 - Demonstrate observation, analysis and synthesis skills with a capacity for criticism and self-criticism.

M03CM18 - Demonstrate a capacity for learning and for autonomous work for professional development.

M03CM19 - Be able to manage, organise and plan chemical processes, applying criteria of quality and environmental conservation.

M03CM20 - Relate chemistry with other disciplines and understand its impact on the industrial and technological society and the importance of the industrial chemical sector.

Together with the following specific skills:

M03CM02 - Possess basic knowledge of the most common industrial technologies in the production of polymers and the engineering of the reactors used in the production process.

M03CM04 - Possess adequate knowledge of the large families of industrial polymers, their production, properties and most typical applications.

M03CM12 - Possess knowledge of the network tools and services that enable searches for information in the field of chemistry and similar fields.

M03CM13 - Transmit phenomena and processes related to chemistry and similar fields in verbal presentations and/or written reports and in a comprehensible way in either of the two official languages of the Autonomous Community of the Basque Country or in English.

M03CM14 - Be able to use the information and knowledge gained from the module for training in existing or emerging fields related to chemistry.

CONTENIDOS TEÓRICO-PRÁCTICOS

- 1.- Introduction to Polymerization Processes
- 2.- Ideal reactors. Chemical reactions engineering
- 3.- Coordination polymerization engineering
- 4.- Free radical (co)polymerization engineering in homogeneous systems
- 5.- Polymerization in dispersed phase. Suspension and emulsion polymerization
- 6.- Step-growth polymerization

TEACHING METHODS

Theoretical and practical concepts (exercises, assignments, presentations…) will be developed in the on-site lectures. This part of the course will be evaluated by a single written exam and it will take 60% the final mark.

Computer simulations will be conducted to solve an assignment of a polymerization process. In this part of the course, the student will learn how to simulate polymerization processes using a commercial software package (Predici). In this activity, the student will have to seek for the necessary information in the literature, will have to develop a mathematical model for the process and solve it numerically using the simulation package. Finally, he/she will write a report and present it to classmates.

Lab training is also a part of the course. The student will learn how to run a polymerization reaction, and he/she will learn how to measure the kinetics and the microstructure of the polymer under investigation.

Journals

Macromolecules
Industrial and Engineering Chemistry Research
Polymer

Web sites of interest

Macrogalleria: <http://pslc.ws/spanish/index.htm>
Working Party on Polymer Reaction Engineering: <http://www.wppre.com/>

OBSERVATIONS

Nothing