

29941 - Polymerization Reactions

Syllabus Information

Academic year: 2023/24

Subject: 29941 - Polymerization Reactions

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

The student is expected to acquire elementary knowledge about the structure, characterization and properties of organic polymers and to understand the fundamental concepts of the reactions of polymerization. Therefore, it provides you with key knowledge for the development of your future professional activity.

These approaches and goals are aligned with the Sustainable Development Goals, SDGs, of the Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>) and certain goals, in such a way that it provides training and competence to the student to contribute to some extent to their achievement:

- Goal 4: Ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all . Objective 4.7.
- Goal 8: Labor and economic growth. Objective 8.4.
- Goal 9: Industry, Innovation and Infrastructure. Objective 9.4.

2. Learning results

To pass this subject, students shall demonstrate they has acquired the following results:

- Know organic polymeric systems, is capable of preparing organic polymers and of performing polymerization processes.
- Properly apply the theoretical concepts in the development of chemical processes of polymerization in the laboratory .
- Know the type of polymerization reactors and is able to select the most suitable equipment to carry out a given polymerization reaction .

The learning results of this subject are essential for the student to perform satisfactorily their professional activity in the future . In polymerization processes, as in other processes in the chemical industry, knowledge of the reaction, the way the process is carried out and characterization of the products obtained are required. Hence, the knowledge, design, optimization and selection of the polymerization process is important for a chemical engineering graduate who must be an expert in compounding and transformation.

3. Syllabus

1.- Lectures and problem solving

Unit 1. Introduction (1 h)

Unit 2. Polymerization processes (16 h)

Unit 3. Polymerization reactors (3 h)

Unit 4. Products (3 h)

Unit 5. Structure/properties relationship (5 h).

Unit 6. Criteria for the choice of base polymer and compound formulation (2 h)

- Problems (10 h)

The delivery and exhibition of the work will be done in a tutored manner throughout the term.

2.- Laboratory practices

- Polymerization of styrene (4 h)
- Synthesis of an unsaturated polyester-styrene graft copolymer (4 h)
- Polyurethane preparation (4 h)
- Cellulose modification (4 h)
- Water-soluble polymers of industrial interest (4 h)

4. Academic activities

Lectures and problem solving (40 h) the theory of the topics will be taught and model problems will be solved by the teacher and the student supervised by the teacher.

Laboratory practices (20 h). 5 laboratory practice sessions of 4 hours, directly related to the theoretical part.

The tutored work (22 h) will involve a written paper and an oral presentation. It will be distributed throughout the entire semester, being tutored and assessed.

Individual study (65 hours). It is recommended that the student carry out individual study on a continuous basis throughout the semester.

Final assessment(3 h).

5. Assessment system

The student must demonstrate that he/she has achieved the expected learning outcomes by means of the following activities assessment activities

Option 1:

This option includes:

- Completion and delivery of the results of 5 laboratory practices (40% of the final grade)
- Delivery and presentation of a paper (15% of the final grade)
- Final test(40% of the final grade)
- Active participation of students (5% of the final grade)

A minimum grade of 3.5 out of 10 is required to pass the subject.

Option 2:

Those students who do not wish to follow the assessment of option 1, may choose to take a single final test (100% of the final grade)

The second call for assessment will be carried out by means of a global test carried out in the period established for this purpose in the academic calendar