



IDENTIFYING DATA

Industrial organic chemistry

Subject	Industrial organic chemistry			
Code	V12G350V01923			
Study programme	Grado en Ingeniería en Química Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Longo González, María Asunción Moure Varela, Andrés			
E-mail	mlongo@uvigo.es			

Web

General description In this course, the fundamental aspects related to the structure of organic compounds and their reactions are presented. Particular attention will be paid to polymerization methods and techniques, and to the intermediate chemicals most frequently used on an industrial scale, as well as other sectors of interest in the organic chemical industry.

English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

Training and Learning Results

Code			
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.		
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering specializing in Industrial Chemistry.		
C4	CE4 Ability to understand and apply the basic knowledge of general chemistry, organic chemistry and inorganic chemistry, and their applications in engineering.		
D2	CT2 Problems resolution.		
D9	CT9 Apply knowledge.		
D10	CT10 Self learning and work.		
D16	CT16 Critical thinking.		
D17	CT17 Working as a team.		

Expected results from this subject

Expected results from this subject	Training and Learning Results		
(*)	B3	C4	D10 D16 D17
New	B3 B4	C4	D2 D9 D10 D16 D17
New	B3 B4	C4	D2 D9 D10 D16 D17

Contents

Topic	
1. The organic chemical industry.	1.1. Introduction and general characteristics. 1.2. Raw materials 1.3. Petrochemistry 1.4. Intermediate products and final products.
2. Fundamental concepts of organic chemistry.	2.1. Bonds, hybridisation and geometry. 2.2. Hydrocarbons. Aromaticity. Resonant structures. 2.3. Functional groups. 2.4. Intermolecular interactions 2.5. Conformations and isomery.
3. Reactivity of organic compounds.	3.1. Kinetics and mechanisms of reaction. 3.2. Homogeneous and heterogeneous catalysis. 3.3. Reactivity of organic compounds. 3.3.1. Reactivity of substrates 3.3.2. Electronic structure of reagents. 3.3.3. Reaction intermediates 3.4. Types of organic reactions.
4. Ethylene. Propylene. Intermediate and end-products. Polymerisation.	4.1. Addition reactions. 4.2. Industrial products from ethylene. 4.3. Industrial products from propylene. 4.4. Polymeric materials. Classifications. 4.4.1. Polymerisation reactions. Additions and condensations. 4.4.2. Polyethylene and polypropylene.
5. Fraction C4. Dienes and polyenes. Intermediate and end-products. Fibres and elastomers.	5.1. Butenes. 5.2. Dienes, types and characteristics. 5.3. Synthesis of Diels Alder. 5.4. Elastomers. 5.4.1. Isoprene rubbers. 5.4.2. Isobutylene rubbers. 5.4.3. 1,3-butadiene rubbers. 5.5. Fibres 5.5.1. Acrylic, polyamides and polyesters.
6. Fraction BTX. Intermediate and end-products. Resins.	6.1. Reactivity of the arenos. Benceno. 6.2. Effect of substituentes. Activators and deactivators. 6.3. Industrial derivatives of toluene. 6.3.1. Production of phenol and its derivatives. Phenolic and epoxy resins 6.3.2. Polyesters. Styrene polymers.
7. Other organic compounds of industrial interest.	7.1. Nitrogen compounds. 7.1.1. Dyazonium salts . Dyes and pigments. 7.2. Halogenated compounds. Solvents and insecticides. 7.3. Oxygene compound. Organic acids, alcohols and ketones of industrial interest. 7.4. Tensioactive agents. Types and characteristics.

Planning

	Class hours	Hours outside the classroom	Total hours
Problem solving	9	27.5	36.5
Laboratory practical	18	18	36
Mentored work	1.5	14	15.5
Lecturing	16	40	56
Problem and/or exercise solving	2	0	2
Presentation	2	0	2
Objective questions exam	2	0	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Problem solving	Throughout the course, exercises will be solved, either in the classroom or autonomously by the students, and handed out for evaluation if needed.

Laboratory practical	Laboratory practices will be carried out, and they will include questions or exercises, which must be submitted for evaluation. This activity is mandatory to pass the course.
Mentored work	Topics related to the contents of the course will be proposed to the students, so that they prepare an individual or group work on any of them.
Lecturing	It will consist of the exposition of the contents of the course, based on the proposed bibliography and the documentation provided on the FAITIC platform

Personalized assistance

Methodologies	Description
Lecturing	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.
Problem solving	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.
Laboratory practical	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.
Mentored work	Personalized attention to students will be provided for all activities in the course, in the hours scheduled for tutorials.

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	Attitude, participation and quality of the work carried out in the laboratory will be considered. In addition the student will respond to questions raised in each of the practices, and deliver the required lab reports.	20	B3 B4	C4	D9 D16 D17
Problem and/or exercise solving	Partial tests will be carried out, which will include short answer questions and problems, for the evaluation of the skills acquired in relation to the contents of the course.	30	B3	C4	D9 D16
Presentation	The quality of the contents of the delivered work will be evaluated, together with the presentation and the answers to the questions.	20	B3 B4	C4	D10 D16 D17
Objective questions exam	There will be a final exam, which will include short questions and problems, to evaluate the acquisition of the competences of the course.	30	B3 B4	C4	D2 D9 D16

Other comments on the Evaluation

1. Considerations on continuous evaluation.

- The participation of the student in any of the acts of evaluation of the course will imply the condition of presented and, therefore, the assignment of a qualification.
- Attendance at a minimum of 80% of laboratory practices is mandatory, which cannot be rescheduled.
- To pass the course, students must obtain at least a score of 5 points out of 10 in all the evaluation sections (laboratory practices, project, partial exam, final exam). So, the overall qualification required to pass the course, resulting from the weighted sum of all the evaluation sections, will be 5 points out of 10.
- Students may waive the continuous assessment system through the procedure and within the period established by the School. If such resignation is requested and authorized, 100% of the grade will be assigned by taking a final exam, in which questions can be asked about all the topics taught in the course, including those corresponding to practical classes.

2. Considerations about the exams (partial and final).

- **Partial exam.** During the course there will be a partial and eliminatory test, which will include short questions and problems or exercises, and which will have a weight in the overall grade of 30 %. To pass this test, a score of at least 5 points out of 10 must be obtained.
- **Final exam 1st opportunity.** It will include the contents not evaluated in the partial test, and will have a relative weight of 30 % in the overall grade of the course. In case of not having passed the partial test, the students will be given the opportunity to repeat the evaluation of the corresponding contents, on the same date assigned for the final

exam.

- **Final exam 2nd opportunity.** The exam may put forward questions about all the subjects taught in the course, including those corresponding to practical classes. Students who have obtained the minimum qualification established in this guide for the various evaluation sections (laboratory practices, project, partial exam), may only be assessed for the rest of the content.

3. Considerations on the qualification records

- **1st opportunity qualification record.** The global mark will be the weighted sum of those obtained in all the assessments carried out (laboratory practices, memory and presentation of project, written exams), provided that the minimum required grades have been passed. In case of failing or not showing up for the partial and/or final exam, the record will reflect the Fail rating, with a numerical value resulting from the weighted sum of the laboratory practices and the project, applying the global grade contribution percentages specified in this guide; the contents approved in these two sections will be considered as passed with a view to the 2nd opportunity qualification record.
- **2nd opportunity qualification record.** The global mark will be the weighted sum of those obtained in all the assessments carried out, provided that the minimum required marks have been passed. In case of failing or not taking the final exam, the record will reflect the Fail grade, with a numerical value resulting from the weighted sum of the laboratory practices and the project, applying the global grade contribution percentages specified in this guide

4. Ethical considerations

The student is expected to exhibit an adequate ethical behavior. In case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others), it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade in the current academic year will be Fail (0.0).

The use of any electronic device during the evaluation tests will not be allowed unless expressly authorized. The introduction of a non-authorized electronic device in the exam room will be considered a reason for not passing the subject in this academic year and the overall rating will be Fail (0.0)

Updated exam calendar: <https://eei.uvigo.es/gl/alumnado/planificacion-academica/calendario-de-exames/>

Lecturer acting as course coordinator: María Asunción Longo González

Sources of information

Basic Bibliography

Primo Yúfera, E., **Química orgánica básica y aplicada. Tomo I y II.**, Reverté,

Harold, A. Wittcoff, **Productos químicos orgánicos industriales. Vol 1. Materias primas y fabricación.**, Limusa,

Philip S. Baley, **Química orgánica. Conceptos y aplicaciones**, Pearson,

M^ª José Climent Olmedo, et al., **Química orgánica. Principales aplicaciones industriales.**, Univ. Politécnica de Valencia,

Harold A. Wittcoff, **Productos químicos orgánicos industriales. Vol 2. Tecnología, formulaciones y usos.**, Limusa,

Complementary Bibliography

Green, Mark M., **Organic chemistry principles and industrial practice.**, Wiley -VCH,

McMurry, **Química orgánica.**, Cengage,

Harold A. Wittcoff, **Industrial Organic Chemicals**, Wiley,

Issa Katime Amashta, et al., **Introducción a la ciencia de los materiales poliméricos. Síntesis y caracterización.**, Univ. País Vasco.,

Recommendations

Subjects that are recommended to be taken simultaneously

Bioelectrochemistry/V12G350V01921

Biotechnological processes and products/V12G350V01922

Subjects that it is recommended to have taken before

Chemistry: Chemistry/V12G350V01205

Experimentation in industrial chemistry 1/V12G350V01505

Experimentation in industrial chemistry 2/V12G350V01602

Chemical engineering 2/V12G350V01503

Industrial chemistry/V12G350V01504

Other comments

To enroll in this course it is necessary to have passed or be enrolled in all the subjects of the courses lower than the course in which this subject is scheduled.

In case of discrepancies, the Spanish version of this guide will prevail.
