Universitat Autònoma de Barcelona

2018/2019

Organic Chemistry of Biochemical Processes

Code: 100889
ECTS Credits: 6

Degree	Type	Year	Semester
2500252 Biochemistry	FB	1	2

Contact

Name: Albert Granados Toda
Email: Albert.Granados@uab.cat

Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

English use is not expected at classroom

Teachers

Jordi Marquet Cortés

Prerequisites

It would be convenient to have taken o being studing the courses "Fonaments of chemistry" and "Termodinàmica i cinètica".

Objectives and Contextualisation

The main goals of this course are that the student could achieve the necessary knowledge in order to understand the molecular structures and main chemical reactions involved in biochemical processes. Thus, special focus will be made in the different mechanism that usual organic reactions follow. Organic molecules are involved in both primary and secondary metabolism, being fundamental part in the biosynthesis and different transformations of carbohydrates, amino acids, peptides and proteins, along with the nucleic acids. In order to understand other processes as the mechanism of action of drugs and their metabolism, knowledge of organic chemistry is also mandatory.

Content

Introduction. Main organic reactions. Polar reactions and radical-mediated reactions. Intermediates species in organic reaction. Kinetic and thermodinamyc control. Hammond postulate.

Nucleophilic substitution on saturated carbon. Mechanism and stereochemistry. Substituent effects. Relative reactivity of nucleophiles. Leaving groups. Examples: SAM methylations, hydrolisis reactions, ciclyzations. Competitive reactions: elimination versus rearrangements. Biosynthetic examples.

Elimination reactions. Mechanisms and stereochemistry. Regiochemistry of E2 elimination. Synthesis of alkenes. Biological examples.

Electrophilic addition to double bonds. Mechanism: regio- and stereochemistry. Olefines hydration: synthesis of alcohols. Syn and anty additions. Examples.

Nuclephilic addition to carbonyl group and related reactions. Carbonyl group reactivity. Additions of nitrogen compounds: formation of imines and enamines. Piridoxal phosphate and transamination. Hidryde ion as nucleophile: NADH. Addition-Elimination reactions. Reactions with alcohols: acetal formation. Carbohydrates: cyclic hemiacetal forms. Aldol reaction. Biosynthesis of fructose and Glucose. Conjugated addition reactions: examples in the biosynthesis of lignans and other metabolites.

Substitution reactions on carbonyl group derivatives. Carboxilic acids and related compounds. Peptides and proteins. Claisen condensation. Biosynthesis of fatty acids and polyketides. Beta-ketoacids decarboxilation.

Aromatic compounds and electrophilic substitution. Aromaticity. Aromatic electrophilic substitution: mechanism and examples. Influence of substituents in the reactivity. Alkylation and acylation: biological examples. Heterocyclic aromatic compounds of biological interest: purines and pirymidines. Nucleic acids.

Radical reactions. Introduction. Starters of radical reactions. Oxidation with molecular oxygen. An important example: biosynthesis of prostaglandynes from fatty acids polyunsaturated. Oxidative dimerization of phenols. Biological examples.