CHEM 2008 ORGANIC CHEMISTRY

Credit Points 10

Legacy Code 300876

Coordinator Christopher Gordon (https://directory.westernsydney.edu.au/search/name/Christopher Gordon/)

Description Organic molecules are at the heart of the chemistry of life and industry. This unit builds on the fundamental chemical principles, exploring reaction mechanisms and the concept of reactivity and stereo- and regio-selectivity of many of the central reactions that form the basis of living processes, modern research, and contemporary industrial transformations. The unit contains a problem-based module on the application of spectroscopic methods to organic structure elucidation, focusing on spectroscopic data and a practical section on organic synthesis. The unit will focus on complex organic molecules including biologically relevant molecules, and examples from chemical industries, medicinal and pharmaceutical industries.

School Science

Discipline Organic Chemistry

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) CHEM 1005

Equivalent Subjects BIOS 2039 - Molecules of Life Synthesis and Reactivity CHEM 2009 - Organic Chemistry

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Demonstrate how the bonding and electronic structure in organic molecules relates to some of the calculated physical and chemical properties
2. Recognise and predict the product of organic reactions outlined in the subject content based on theoretical concepts and examples of sustainable practical approaches by industry
3. Integrate scientific knowledge on the mechanism, regio- and stereo-specific organic reactions with experimental outcomes across the discipline to analyse and solve problems
4. Predict the mechanism involved in addition, elimination, and substitution reactions, based on the factors of kinetics and thermodynamics which influence these pathways
5. Analyse qualitatively and quantitatively the spectroscopic data (Infrared, UV and 1H Nuclear Magnetic Resonance (NMR) spectroscopy), particularly in the elucidation of organic structures
6. Describe enolate chemistry and its involvement in biochemical pathways like Citric Acid cycle
7. Conduct basic chemical investigations on synthetic techniques for organic compounds, individually and/or a member of a team, quantitative analysis of yield, determination of product purity using scientific instrumentation, identifying accuracy and reliability, carrying out risk assessments and conforming to safe laboratory practices
8. Communicate experimental data correctly in a Lab Report and/or record of the results of their investigations demonstrating analysis of data, awareness of the conventions of scientific writing with chemical mechanisms

Subject Content

1. Reactivity of organic compounds as a function of chemical structure, particularly electron distribution
2. Mechanisms of major organic reaction types including
- Addition reactions of alkenes, alkynes, aldehydes and ketones
- Substitution reactions of alcohols, alkyl halides and carboxylic acid derivatives
- elimination reaction of alcohols and alkyl halides
- Aromatic compounds and its resonance stability and effect on electrophilic Substitution reactions
- Redox reactions of alcohols, aldehydes, ketones, carboxylic acids and esters

and the factors of kinetics and thermodynamics which influence these pathways, formation of carbocations and carbanions and their stability.
3. Stereochemistry of organic molecules: enantiomers and diastereomers and reactions including
- Addition reactions (Halogenation, hydrogenation, hydrohalogenation)
- SN1 and SN2 reactions
- E1 and E2 reactions
- electrophilic Aromatic substitutions

4. Factors involved in substitution, addition, elimination and redox reactions of the major functional groups
5. Aromatic compounds, its resonance stability and the effect on electrophilic aromatic substitution reactions
6. Selection of specific reagents and manipulation of functional groups in controlled synthesis of important organic compounds
7. Structure elucidation of organic molecules using spectroscopy - UV, IR, 1H NMR
- Infrared (IR) spectroscopy will be used to identify The bond vibrations in common Functional groups, conjugation via UV spectroscopy and Basic concept of Nuclear Magnetic resonance (NMR) spectroscopy, structure elucidation using Chemical shifts and spin coupling.

8. Introduction to enolate chemistry and its involvement in biochemical pathways like Citric acid cycle

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/ Group Task
Practical	100 words and chemical structures per Practical (x6); 200 words (x2) and chemical structures and mechanisms	30	Y	Individual
Report	Mostly chemical structures and Part 2 - up to 1,000 words	15	N	Individual

Intra-session Exam	1.5 hours	15	Y	Individual
Final Exam	2 hours	40	Y	Individual

Prescribed Texts

- Organic Chemistry by David Klein 2015 John Wiley and Sons,USA

Teaching Periods

Autumn

Campbelltown

Day

Subject Contact Christopher Gordon (https://directory.westernsydney.edu.au/search/name/Christopher Gordon/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CHEM2008_22-AUT_CA_D#subjects)

Parramatta - Victoria Rd

Day

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