

# CH276-15 Organic Synthesis and Reactivity

**26/27**

**Department**

Chemistry

**Level**

Undergraduate Level 2

**Module leader**

Martin Wills

**Credit value**

15

**Module duration**

10 weeks

**Assessment**

20% coursework, 80% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

This module builds on core concepts covered in Year 1 to understand more advanced organic reactions, expanding the synthetic and mechanistic chemistry toolbox and enabling basic design principles, based on retrosynthetic analysis, for the synthesis of simple organic molecules to be understood.

[Module web page](#)

### Module aims

By the end of the module students should be able to use their knowledge to devise syntheses of simple and intermediate-level organic molecules.

### Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The module is split into a number of topics:

Aromatic and heterocyclic chemistry

Palladium catalysed couplings

Alkene chemistry

Oxidations and reductions

Conformational analysis

Carbonyl and enolate chemistry

Elimination reactions

Physical organic chemistry

Included will also be simple retrosynthesis and synthetic strategies, and industrial applications.

## Learning outcomes

By the end of the module, students should be able to:

- Reflect on the organic chemistry encountered in year 1 from the point of view of retrosynthesis (a disconnections approach)
- Understand the reactions, including regiochemistry, in the reaction of aromatic and heteroaromatic rings.
- Understand the mechanisms and applications of palladium catalysed coupling reactions (e.g. Suzuki, Heck, Buchwald-Hartwig).
- Understand how to make cis- and trans-alkenes selectively, and how they react diastereoselectively, including Diels-Alder reactions and ozonolysis.
- Understand oxidation level and how to interconvert carbonyl compounds selectively via oxidation and reduction.
- Predict and understand the oxidation and reduction reactions of other functional groups such as alkenes.
- Be able to draw simple linear, branched and small ring alkanes using three-dimensional representations such as Newman projections and chair drawings.
- Understand factors controlling the relative energies of molecule conformations using these representations.
- Understand and predict the relative reactivity of carbonyl compounds and how they can react selectively depending on reaction conditions.
- Understand regio- and stereoselectivity in enolate formation and how they react stereoselectivity in both alkylation and aldol reactions.
- Understand the mechanistic differences in E1, E2, and E1cb reactions, including what factors determine which mechanism applies, and explain and predict the regio- and stereochemical outcome of these reactions.
- Understand the basis and uses of simple kinetic isotope effects and free energy relationships and understand how the results of these experiments can be used in determining reaction mechanisms.
- Develop simple strategies, via disconnections and retrosynthesis analysis for the synthesis of functional organic molecules.

## Indicative reading list

[Reading lists can be found in Talis](#)

## Research element

Team project in groups of 5-6 students, designing a theoretical synthetic approach to a target molecule.

## Subject specific skills

Problem solving  
Teamwork  
Organisation  
Time management

## Transferable skills

Problem solving  
Teamwork  
Organisation  
Time management

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## Study

### Study time

Type	Required
Lectures	30 sessions of 1 hour (20%)
Tutorials	3 sessions of 1 hour (2%)
Practical classes	3 sessions of 1 hour (2%)
Private study	84 hours (56%)
Assessment	30 hours (20%)
Total	150 hours

### Private study description

N/A

### Costs

No further costs have been identified for this module.

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## Assessment

You do not need to pass all assessment components to pass the module.

## Assessment group D2

	Weighting	Study time	Eligible for self-certification
<b>Assessment component</b>			
Retrosynthetic and synthetic route planning	20%	30 hours	No
Team project in the area of molecular disconnection, retrosynthesis and literature synthetic precedent. The assessment is based on a written team report, along with personal and team self-analysis and appraisal.			
<b>Reassessment component</b>			
Retrosynthetic and synthetic route planning			No
Individual project in the area of molecular disconnection, retrosynthesis and literature synthetic precedent'			
<b>Assessment component</b>			
Centrally-timetabled examination (On-campus) Examination	80%		No

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- Students may use a calculator
  - Periodic Tables
  - Answerbook Pink (12 page)

Reassessment component is the same

## Feedback on assessment

Feedback on assessed work provided via Moodle. Cohort level examination feedback will be provided after the June examination period.

[Past exam papers for CH276](#)

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## Availability

### Pre-requisites

To take this module, you must have passed:

- Any of
  - [CH167-15 Carbon and the Chemistry of Life](#)
  - [CH171-15 Carbon and the Chemistry of Life for Biochemists](#)

### Post-requisite modules

If you pass this module, you can take:

- CH3H6-15 Chemical Biology

## Courses

This module is Core for:

- UCHA-4 Undergraduate Chemistry (with Intercalated Year) Variants
  - Year 2 of F101 Chemistry (with Intercalated Year)
  - Year 2 of F122 Chemistry with Medicinal Chemistry (with Intercalated Year)
- UCHA-3 Undergraduate Chemistry 3 Year Variants
  - Year 2 of F100 Chemistry
  - Year 2 of F121 Chemistry with Medicinal Chemistry
- UCHA-F110 Undergraduate Master of Chemistry (with Industrial Placement)
  - Year 2 of F110 MChem Chemistry (with Industrial Placement)
  - Year 2 of F112 MChem Chemistry with Medicinal Chemistry with Industrial Placement
- Year 2 of UCHA-F107 Undergraduate Master of Chemistry (with Intercalated Year)
- UCHA-F109 Undergraduate Master of Chemistry (with International Placement)
  - Year 2 of F109 MChem Chemistry (with International Placement)
  - Year 2 of F111 MChem Chemistry with Medicinal Chemistry (with International Placement)
- UCHA-4M Undergraduate Master of Chemistry Variants
  - Year 2 of F105 Chemistry
  - Year 2 of F125 MChem Chemistry with Medicinal Chemistry
- Year 2 of UCHA-F127 Undergraduate Master of Chemistry with Medicinal Chemistry (with Intercalated Year)