

Year 12 Chemistry: Unit 4 – Structure, synthesis and design

In Unit 4, students explore the ways in which models and theories relate to chemical synthesis, structure and design, and associated applications; and the ways in which chemistry contributes to contemporary debate regarding current and future uses of local, regional and international resources. Students focus on the principles and application of chemical synthesis, particularly in organic chemistry, and consider where and how functional groups can be incorporated into already existing carbon compounds in order to generate new substances with properties that enable them to be used in a range of contexts. Current and future applications of chemistry include the development of specialised techniques to create or synthesise new substances to meet the specific needs of society, such as pharmaceuticals, fuels, polymers and nanomaterials.

Contexts that could be investigated in this unit include green polymer chemistry, insecticides and herbicides, biofuels and molecular synthesis. Through the investigation of these contexts, students may explore the contradiction between organic chemistry advances and the environmental impact accompanying these practices.

Participation in a range of experiments and investigations will allow students to progressively develop their suite of science inquiry skills while gaining an enhanced appreciation of organic structure, reactions and syntheses. Collaborative experimental work also helps students to develop communication, interaction, character and management skills.

Throughout the unit, students develop skills in experimental methodology, qualitative and quantitative data analysis and current organic developments to describe and explain the importance of this branch of chemistry to society.

Unit objectives

Unit objectives are drawn from the syllabus objectives and are contextualised for the subject matter and requirements of the unit. Each unit objective must be assessed at least once.

Students will:

1. describe and explain the properties and structure of organic materials and chemical synthesis and design
2. apply understanding of the properties and structure of organic materials and chemical synthesis and design
3. analyse evidence about the properties and structure of organic materials and chemical synthesis and design
4. interpret evidence about the properties and structure of organic materials and chemical synthesis and design
5. investigate phenomena associated with the properties and structure of organic materials and chemical synthesis and design
6. evaluate processes, claims and conclusions about the properties and structure of organic materials and chemical synthesis and design
7. communicate understandings, findings, arguments and conclusions about the properties and structure of organic materials and chemical synthesis and design

Unit Assessment

IA3 – Research Investigation **(Cancelled due to COVID)**

Timing: Handed out Term 2, week 9 and is due Term 3, week 4.

YEAR 12 TERM 2

IA2

W5 Unit 4 Starts, Topic 1 Structure of organic compounds Ch 9.1 p220 Functional groups Ch 9.2 p226	IA2
	IA2
W6 Unit 4 Starts, Topic 1 Structure of organic compounds Ch 9.1 p220 Hydrocarbons Ch 9.2 p226 Functional groups	Hydrocarbons, naming and drawing and benzene
	Naming rules practice
	Draft due end of the lesson IA2 (9)
W7	Functional groups
	Functional groups/esters
	Questions
W8 Structural formulas Ch 9.3 p232	Structural formulas
	Check up for IA2
	Check up for IA2
W9 Ch 9.4 p234 Isomers Physical properties and trends Ch 9.5 p238	Due date for IA2 Mandatory Prac – 3D models
	Isomers
	Physical prop and trends- disp and H-bonding
W10 Unit 4 Topic 1 Ch 10 p250 Organic reactions and pathways Addition and elimination rn Ch 10.1 p 252 Oxidation and reduction rn Ch10.2 p 256 Condensation rn Ch 10.3 p 260 Substitution rn Ch10.4 p 263	Addition and elimination reactions
	Oxidation and reduction
	Condensation reactions and substitution reactions
W1 Unit4 topic 1	Carbohydrates and Proteins
	Proteins and lipids Synthetic polymers

<p>Carbohydrates Ch 11.1 p276 Lipids Ch 11.2 p280</p> <p>Proteins Ch11.3 p283</p> <p>Synthetic Polymers Ch 11.4 p290</p>	<p>Carbohydrates and Proteins</p>
<p>W2 Unit 4 Topic 1</p> <p>Analytical Techniques (6) Chromatography and electrophoresis Ch 12.1 p300 Data from analytical tech Ch 12.2 p306 Analysing data from spectra Ch 12.3 P312</p>	<p>Chromatography and Electrophoresis of proteins</p> <p>Data from analytical techniques (prac ??)</p> <p>Analysing data from spectra</p>
<p>W3 Analysing data from spectra Ch 12.3 P312</p> <p>Unit 4 Topic 2 Chemical Synthesis Ch 13.1,13.2 & 13.3 p324</p>	<p>Analysing data from spectra</p> <p>Chemical Synthesis</p> <p>Fuels Atom economy and green synthesis methods</p>
<p>W4 Hydrogen Fuel Cells 13.4 p324</p> <p>Chem synthesis reaction yield Ch 13.5 p337</p>	<p>Fuels inc bio fuels p328 Hydrogen fuel cells</p> <p>Chemical synthesis reaction yield – calcs- p327 MUST do q29 public paper 1</p> <p>Review qns P340</p>
<p>W5 Green Chemsitry Ch 14.1 & 14.2 & 14.3 p344 Atom Economy Ch14.4 p354</p> <p>Unit 4 Topic 2 Macromolecules:</p> <p>Addition polymers Ch 15.1 p362</p>	<p>Making chemistry greener Principles of green chemistry</p> <p>Measuring greenness with atom economy</p> <p>Addition polymers</p>

W6 Submit results for IA2 & IA3 Unit 4 Topic 2 Macromolecules: Condensation polymers Ch15.2 p366 Polymer use Chp 15.3 p369 Amino acids and polypeptides Ch 15.4 373	condensation polymers Polymer use amino acids and polypeptides
W7 Monosaccharides etc Ch 15.5 p 376 Unit 4 Topic 2 Molecular Manufacturing Ch 16.1 p384	Monosaccharides Review Question p381 Molecular Manufacturing- worksheet using QCE Unit 4 (Surfing) p158-159 Revision
W8	Revision Block exams Revision
W9	Revision Block exams Block exams
W10	Block exams Block exams Revision