

Science

We intend to equip our young people with the knowledge needed to understand the world and technology around them. We aim to encourage a curiosity in the natural, physical and chemical world around them; and to foster critical thinking. We strive to provide our young people with a chance to broaden their horizons and provide multiple routes into STEM careers.

Year 13 A Level Chemistry

Term One

Content of study	6.1.1 Aromatic compounds 6.1.2 Carbonyl compounds 6.1.3 Carboxylic acids and esters 5.1.1 How fast?
What are the aims and objectives of this term?	This module introduces several new functional groups and emphasises the importance of organic synthesis. This module also adds NMR spectroscopy to the instrumentation techniques used in organic and forensic analysis. The main areas of organic chemistry studied include: •• aromatic compounds •• carboxylic acids and esters This section extends the range of functional groups encountered in Module 4. Aromatic compounds are first introduced, including the central role of delocalisation within the chemistry of arenes and phenols. Directing groups are also introduced, including their importance to organic synthesis. The important carbonyl compounds, aldehydes and ketones, are then studied. Finally, carboxylic acids and their related functional groups, acyl chlorides and esters, are studied. The importance of acyl chlorides in organic synthesis is emphasised. This module extends the study of energy, reaction rates and equilibria, and the periodic table. The main areas of physical chemistry studied include: ••rate equations, orders of reaction, the rate-determining step ••equilibrium constants, K_c and K_p ••acid–base equilibria including pH, K_a and buffer solutions ••lattice enthalpy and Born–Haber cycles ••entropy and free energy ••electrochemical cells. The main areas of inorganic chemistry studied include: ••redox chemistry ••transition elements.
What previous knowledge is required?	The content within this module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry and Module 4: Core organic chemistry.

	The content within this module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry and Module 3: Periodic table and energy. The largely qualitative treatment of reaction rates and equilibria encountered in Module 3 is developed within a quantitative and graphical context.
How will this term's content help with future learning?	<i>The unit being studied underpin the rest of the A level and mastery of this knowledge is required to move forward in the course with any level of success</i>
Resources	• DocBrown - https://www.docbrown.info/ • Kerboodle - https://www.kerboodle.com
Links to the national curriculum/specification	https://www.ocr.org.uk/Images/171720-specification-accredited-a-level-gce-chemistry-a-h432.pdf 6.1.1 Aromatic compounds 6.1.2 Carbonyl compounds 6.1.3 Carboxylic acids and esters 5.1.1 How fast?
Assessments	<i>4 in total, each is 50-60 minutes in length and consists of past exam questions of varying difficulty and type. These are given at around the 4 week and 6 week periods of the term and focus on subunits. Students are informed ahead of time what exact spec points are to be tested in each paper. Marked and annotated by teachers and a U-A* grade awarded</i>
Term Two	
Content of study	6.2.1 Amines 6.2.2 Amino acids, amides and chirality 6.2.3 Polyesters and polyamides 6.2.4 Carbon-carbon bond formation 6.2.5 Organic synthesis 5.1.2 How far? 5.1.3 Acids, bases and buffers
What are the aims and objectives of this term?	This section focuses on organic nitrogen compounds, including amines, amides and amino acids. Chirality and optical isomerism is also introduced. Condensation polymerisation is also introduced and compared with addition polymerisation. The importance of carbon-carbon bond formation in organic synthesis is stressed. Learners are also able to consider multi-stage synthetic routes towards an organic product. This module allows learners many opportunities to further develop their organic practical skills, especially in preparing and purifying organic solids, including recrystallisation and determination of melting points. The largely qualitative treatment of reaction rates and equilibria encountered in Module 3 is developed within a quantitative and graphical context. This section also allows learners to develop practical

	quantitative techniques involved in the determination of reaction rates and pH. There are many opportunities for developing mathematical skills, including use of logarithms and exponents, when studying the content of this section and when carrying out quantitative practical work.
What previous knowledge is required?	The content within this module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry and Module 4: Core organic chemistry. The content within this module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry and Module 3: Periodic table and energy. Knowledge and understanding of Module 2 and Module 3 will be assumed and examination questions will be set that link their content with this module and other areas of chemistry.
How will this term's content help with future learning?	<i>The unit being studied underpin the rest of the A level and mastery of this knowledge is required to move forward in the course with any level of success</i>
Resources	• DocBrown - https://www.docbrown.info/ • Kerboodle - https://www.kerboodle.com • Google NotebookLM Note Taking & Research Assistant Powered by AI • https://www.briskteaching.com
Links to the national curriculum/specification	https://www.ocr.org.uk/Images/171720-specification-accredited-a-level-gce-chemistry-a-h432.pdf 6.2.1 Amines 6.2.2 Amino acids, amides and chirality 6.2.3 Polyesters and polyamides 6.2.4 Carbon–carbon bond formation 6.2.5 Organic synthesis 5.1.2 How far? 5.1.3 Acids, bases and buffers
Assessments	<i>5 in total, each is 50-60 minutes in length and consists of past exam questions of varying difficulty and type. These are given at around the 4 week and 6 week periods of the term and focus on subunits. Students are informed ahead of time what exact spec points are to be tested in each paper. Marked and annotated by teachers and a U-A* grade awarded</i> <u>Synoptic assessment</u>

	This module provides a context for synoptic assessment and the subject content links strongly with the content encountered in Module 2: Foundations in chemistry and Module 3: Periodic table and energy. ••Atoms, moles and stoichiometry ••Acid and redox reactions ••Bonding and structure ••Periodicity, Group 2 and the halogens ••Enthalpy changes ••Reaction rates ••Chemical equilibrium Knowledge and understanding of Module 2 and Module 3 will be assumed and examination questions will be set that link their content with this module and other areas of chemistry.
Term Three	
Content of study	6.2.5 Organic synthesis 6.3.1 Chromatography and qualitative analysis 6.3.2 Spectroscopy 5.1.3 Acids, bases and buffers 5.2.1 Lattice enthalpy
What are the aims and objectives of this term?	This section demonstrates how analytical techniques introduced in Module 4 (infrared spectroscopy, mass spectrometry and elemental analysis) may be used in combination with NMR spectroscopy to provide evidence of structural features in molecules. The instrumentation methods of analysis studied during the A level course provide learners with an important base of knowledge, understanding and awareness for further study in Higher Education and in many areas of employment in the broad scientific field. This section also looks at how unknown organic functional groups can be analysed and identified using simple test-tube tests Born–Haber cycles are used as a theoretical model to illustrate the energy changes associated with ionic bonding. Entropy and free energy are then introduced as concepts used to predict quantitatively the feasibility of chemical change. Redox chemistry permeates chemistry and the introductory work in Module 2 is developed further within this section, including use of volumetric analysis for redox titrations and an introduction of electrochemistry in the context of electrode potentials.
What previous knowledge is required?	The content within this module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry and Module 4: Core organic chemistry. This section develops and complements the spectroscopic areas of organic chemistry previously encountered (see Module 4: Core organic chemistry; 4.2.4 Analytical techniques).

	Knowledge and understanding of Module 2 and Module 3 will be assumed and examination questions will be set that link their content with this module and other areas of chemistry.
How will this term's content help with future learning?	<i>The unit being studied underpin the rest of the A level and mastery of this knowledge is required to move forward in the course with any level of success</i>
Resources	• DocBrown - https://www.docbrown.info/ • Kerboodle - https://www.kerboodle.com • Google NotebookLM Note Taking & Research Assistant Powered by AI • https://www.briskteaching.com
Links to the national curriculum/specification	https://www.ocr.org.uk/Images/171720-specification-accredited-a-level-gce-chemistry-a-h432.pdf 6.2.5 Organic synthesis 6.3.1 Chromatography and qualitative analysis 6.3.2 Spectroscopy 5.1.3 Acids, bases and buffers 5.2.1 Lattice enthalpy
Assessments	<i>4 in total, each is 50-60 minutes in length and consists of past exam questions of varying difficulty and type. These are given at around the 4 week and 6 week periods of the term and focus on subunits. Students are informed ahead of time what exact spec points are to be tested in each paper. Marked and annotated by teachers and a U-A* grade awarded</i> Synoptic assessment This module provides a context for synoptic assessment and the subject content links strongly with the content encountered in Module 2: Foundations in chemistry and Module 4: Core organic chemistry. ••Atoms, moles and stoichiometry ••Acid and redox reactions ••Bonding and structure ••Organic nomenclature and structures ••Hydrocarbons ••Alcohols and haloalkanes ••Synthesis and analysis Knowledge and understanding of Module 2 and Module 4 will be assumed and examination questions will be set that link their content with this module and other areas of chemistry.
Term Four	
Content of study	Final preparations for External Examinations