

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 12 – A-Level Chemistry

Term One

Content of study	Foundations in Chemistry
What are the aims and objectives of this term?	- Define the term isotope. - Deduce atomic structure from atomic and mass numbers. - Explain the term “relative isotopic mass”. - Calculate relative molecular and relative formula masses. - Outline the use of mass spectrometry in the determination of relative isotopic masses and relative abundances. - Apply knowledge of writing formulae of ionic compounds from ionic charges. - Recall common ions formula and charge. - Construct balanced chemical and ionic equations. - Explain moles and molar units using Avagadro’s constant. - Use the term and calculate empirical formula. - Calculate the formula of hydrated salt from given information. - Use the ideal gas equation. - Use stoichiometric relationships in calculations. - Calculate percentage yield and atom economy. - Recall formula of common acids and alkalis and explain using ions why they are acidic or alkali. - Explain neutralisation reactions in terms of ions. - Plan, carryout and perform titrations and titration calculations. - Describe and draw atomic orbitals of electrons for the first four shells including shapes of s and p orbitals, the number of orbitals making up s-, p- and d-sub-shells and the number of electrons that fill these. - Deduce electron configurations of atoms given the atomic number up to $z=36$, ions given the atomic number and ionic charge, limited to s- and p-blocks to $z=36$. - Applying the above to form dot a cross diagrams of ionic and covalent bonds. - Use of the term “average bond enthalpy” as a measurement of covalent bond strength. - Apply electron pair repulsion to explain shapes of molecules and ions as outline in spec point 2.2.2.
What previous knowledge is required?	Ionic and Covalent bonding, which sorts of elements these occur between. Ions are atoms that have gained or lost electrons and have a charge. Atoms consist of subatomic particles neutrons, protons and electrons, their masses and charges. How to use a periodic table, mass numbers and atomic numbers. Familiarity with the term yield Basic mathematical skills such as percentage calculations

How will this term's content help with future learning?	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
Resources	YouTube – Crash Course Chemistry Orbitals and shells - https://www.youtube.com/watch?v=cPDptc0wUYI&list=PLMFVtaoVOIACuq6-YIKvIUrbkPsgGbi9- Bonding - https://www.youtube.com/watch?v=QXT4OVM4vXI&t=11s 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 2.1.1 - 2.1.4 and 2.2.1 - 2.2.2
Assessments	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, no A* available at AS.
Term Two	
Content of study	2.1.5 Redox 3.1.1 Periodicity 3.1.2 Group 2 3.1.3 The halogens 4.1.1 Basic concepts of organic chemistry 4.1.2 Alkanes
What are the aims and objectives of this term?	This module acts as an important bridge into AS and A Level Chemistry from the study of chemistry within science courses at GCSE level. This module provides learners with a knowledge and understanding of the important chemical ideas that underpin the study of A Level Chemistry: - atomic structure - quantitative chemistry: formulae, equations, amount of substance and the mole - reactions of acids - oxidation number and redox reactions - bonding and structure The importance of these basic chemical concepts is seen as a prerequisite for all further chemistry modules, and it is recommended that this module should be studied first during this course. This module allows learners to develop important quantitative techniques involved in measuring masses, gas and solution volumes, including use of volumetric apparatus. This module introduces organic chemistry and its important applications to everyday life, including current environmental concerns associated with sustainability.

	The module assumes knowledge and understanding of the chemical concepts developed in Module 2: Foundations in chemistry. The module provides learners with a knowledge and understanding of the important chemical ideas that underpin the study of organic chemistry: • nomenclature and formula representation, functional groups, organic reactions and isomerism • aliphatic hydrocarbons • alcohols and haloalkanes • organic practical skills and organic synthesis • instrumental analytical techniques to provide evidence of structural features in molecules. This module also provides learners with an opportunity to develop important organic practical skills, including use of Quickfit apparatus for distillation, heating under reflux and purification of organic liquids. In the context of this module, it is important that learners should appreciate the need to consider responsible use of organic chemicals in the environment. Current trends in this context include reducing demand for hydrocarbon fuels, processing plastic waste productively, and preventing use of ozone-depleting chemicals.
What previous knowledge is required?	This section builds directly from GCSE Science, starting with basic atomic structure and isotopes. Important basic chemical skills are developed: writing chemical formulae, constructing equations and calculating chemical quantities using the concept of amount of substance. The role of acids, bases and salts in chemistry is developed in the context of neutralisation reactions. Finally, redox reactions are studied within the context of oxidation number and electron transfer. This section introduces the concept of atomic orbitals and develops a deeper understanding of electron configurations linked to the periodic table. The central role of electrons in ionic and covalent bonding is then studied. The important role of molecules is studied, including an explanation of polarity and intermolecular forces. Finally, this section looks at how bonding and structure contribute to properties of substances.
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> Learners are also able to develop their mathematical skills during their study of amount of substance and when carrying out quantitative practical work. This module also provides learners with an opportunity to develop important organic practical skills, including use of Quickfit apparatus for distillation, heating under reflux and purification of organic liquids.
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 2.1.5 Redox 3.1.1 Periodicity 3.1.2 Group 2 3.1.3 The halogens 4.1.1 Basic concepts of organic chemistry 4.1.2 Alkanes
Assessments	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, no A* available at AS. 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. • Atoms, moles and stoichiometry • Acid and redox reactions • Bonding and structure Knowledge and understanding of Module 2 will be assumed and examination questions will be set that link its content with this module and other areas of chemistry.
Term Three	
Content of study	3.1.4 Qualitative analysis 3.2.1 Enthalpy changes 3.2.2 Reaction rates 4.1.2 Alkanes 4.1.3 Alkenes 4.2.1 Alcohols
What are the aims and objectives of this term?	This module provides learners with a knowledge and understanding of the important chemical ideas that underpin the study of inorganic and physical chemistry: • the periodic table: periodic and group properties • enthalpy changes and their determination • rates of reaction • reversible reactions and chemical equilibrium • consideration of energy and yield in improving sustainability. This module allows learners to develop important qualitative practical skills, especially observational skills required for analysis, and accurate quantitative techniques involved in determination of energy changes and reaction rates. There are opportunities for developing mathematical skills when studying enthalpy changes and reaction rates and when carrying out quantitative practical work. This section introduces two further functional groups: alcohols and haloalkanes, and considers the importance of polarity and bond enthalpy to organic reactions.

	Throughout this section, there are many opportunities for developing organic practical skills, including preparation and purification of organic liquids.
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. Knowledge and understanding of Module 2 will be assumed and examination questions will be set that link its content with this module and other areas of chemistry.
How will this term's content help with future learning?	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 Learners are also able to develop their mathematical skills during their study of amount of substance and when carrying out quantitative practical work. This module allows learners to develop important qualitative practical skills, especially observational skills required for analysis, and accurate quantitative techniques involved in determination of energy changes and reaction rates. This module also provides learners with an opportunity to develop important organic practical skills, including use of Quickfit apparatus for distillation, heating under reflux and purification of organic liquids.
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 3.1.4 Qualitative analysis 3.2.1 Enthalpy changes 3.2.2 Reaction rates 4.1.2 Alkanes 4.1.3 Alkenes 4.2.1 Alcohols
Assessments	3 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, no A* available at AS. <u>Synoptic assessment</u> This module provides a context for synoptic assessment and the subject content links strongly with content encountered in Module 2: Foundations in chemistry.

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| | <ul style="list-style-type: none">• Atoms, moles and stoichiometry• Acid and redox reactions• Bonding and structure |
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Knowledge and understanding of Module 2 will be assumed and examination questions will be set that link its content with this module and other areas of chemistry.