Subject Curriculum Overview for Academic Year 2022/2023

Subject: A Level Chemistry	Subject Leader: Adem Osbourn	Year Group: 13	AUTUMN TERM

Topic	Key Learning Points	Key Vocabulary	Assessments
Acid-base equilibria	*End Point: Describe acids and bases in terms of Bronsted-Lowry theory. Have a secure knowledge of physical chemistry to understand the equilibria and thermodynamics of acids and bases and carry out pH, pKa and buffer calculations.* • Be able to identify acid-base pairs and define the term pH • Deduce the expression for the dissociation of a weak acid, K_a • Be able to define the ionic product of water, K_w • Be able to interpret pH curves and use them to select suitable indicators for a titration • Understand what a buffer solution is and how it works to stabilise pH • Be able to calculate the pH of a strong acid, weak acid, strong base and buffer • Understand why there is a difference in the standard enthalpy of neutralisation for strong and weak acids	• Conjugate acid/base • Amphoteric • Acid dissociation • Dibasic • Aqueous • Dilution • Equivalence • Titration • Indicator • Buffer • Neutralisation	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, and short quizzes) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • Year 13 students have test weeks in late October, mid-December and internal mock exams in late February. **Homework and Independent study:** • Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions. • Students complete write up and discussion of practical work in their lab book.
Further kinetics	*End Point: To understand how to identify orders of reactions and select appropriate experimental techniques for both continuous rate methods and initial rate methods.* • Deduce the order with respect to a substance and for an overall reaction from: concentration-time graphs, initial rate methods, rate-concentration graphs. • Identify the rate determining step for a reaction from its rate equation and deduce the reaction mechanism for a reaction from its rate equation and balanced symbol equation • Use the Arrhenius equation to explain the effect of temperature on a rate constant.	• Rate of reaction • Rate equation • Order of reaction • Half-life • Initial-rates • Continuou	
Further energetics	*End Point: Understand how the feasibility of reactions can be predicted and what factors affect the magnitude of some of the values involved for calculations of enthalpy, entropy and therefore Gibbs energy.* • Be able to construct Born-Haber cycles and use them to solve enthalpy calculations • Understand what factors effect lattice energy • Understand the factors that affect the polarising power of a cation and polarisability of an anion and understand the factors that affect the degree of hydration of an ion • Be able to define entropy and describe the factors that affect it • Be able to calculate the entropy of a system, surroundings and the total entropy • Be able to calculate Gibbs energy and use it to predict whether a reaction is feasible • Understand why some thermodynamically feasible reactions kinetically inhibited	• Aldehyde • Alkane • Alkene • Alcohol • Carboxylic acid • Cracking • Curly arrows	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: A Level Chemistry	Subject Leader: Adem Osbourn	Year Group: 13	SPRING TERM
Topic	**Key Learning Points**	**Key Vocabulary**	**Assessments**
Further Redox	*End Point: Understand how electrochemical cells can be constructed and how values for half cells can be used to predict the feasibility of a reaction.* • Calculate a standard EMF by combining two standard electrode potentials and predict the thermodynamic feasibility of a reaction using standard electrode potentials • Write cell diagrams using the conventional representation of half-cells • Understand the limitations of predictions made using standard electrode potentials, in terms of kinetic inhibition and departure from standard conditions • Understand the methods used in redox titrations	• Oxidation • Reduction • Electrode • Electromotive Force (emf) • Electrochemical cell • Feasibility • Titration	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, and short quizzes) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • Year 13 students have test weeks in late October, mid-December and internal mock exams in late February. **Homework and Independent study:** • Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions. • Students complete write up and discussion of practical work in their lab book.
Transition Metals	*End Point: Understand how transition metals form complex ions and why these are coloured. Use knowledge of transition metal oxidation state to explain why they act as catalysts.* • Deduce the electronic configurations of atoms and ions of the d-block elements of period 4 • Understand why transition metals show variable oxidation number • Understand how dative bonding is involved in the formation of complex ions • Describe a complex as a central metal ion surrounded by ligands and understand that the colour of ions results from splitting of the energy levels of the d-orbitals by ligands	• Transition Metal • Ligand • Complex • Complex ion • Coordination number • Denticity • Catalyst	
Functional Groups in Organic Chemistry	*End Point: Understand how to identify key functional groups in organic molecules and be able to describe some of their reactions and how they can be formed.* • Describe optical isomerism as a result of chirality in molecules with a single chiral centre • Identify the aldehyde, ketone, carboxylic acid, acyl chloride, ester, amine and amide functional groups and describe their physical properties, relating to intermolecular forces • Describe how carboxylic acids, esters, polyesters, amines, amides and polyamides are prepared, including the conditions and understand redox reactions of carbonyl compounds & acid – base reactions of amines, amino acids and peptides	• Isomerism • Chirality • Carbonyl • Redox • Physical Properties • Hydrolysis • Condensation • Zwitterion	
Organic Analysis and Organic Synthesis	*End Point: Know how to use analytical techniques to identify organic molecules. Plan reaction schemes for familiar and unfamiliar compounds, identifying safety measures and purification.* • Deduce the empirical, molecular and structural formulae of compounds from data obtained from combustion analysis, elemental percentage composition, characteristic reactions of functional groups, infrared spectra, mass spectra and nuclear magnetic resonance • Plan reaction schemes and select and justify suitable practical procedures	• Distillation • Solvent Extraction • Washing/ Drying • Filtration • Recrystallisation • Chemical shift	

Subject Curriculum Overview for Academic Year 2022/2023

Subject: A Level Chemistry	Subject Leader: Adem Osbourn	Year Group: 13	SUMMER TERM

Topic	Key Learning Points	Assessments
Revision	*End point: Recap knowledge from the A Level course, focusing on topics that students have a less secure understanding or less confidence with. Building exam technique to apply knowledge to application style questions.* • Students are guided to structure their revision • Students have access to a lesson resources if they need to go back to the original source as well as past paper questions, full past papers for timed practice and extra resources such as a guided revision workbook. These should be used for practising recall. • To help structure their revision students are provided with an exemplar revision timetable and checklist of content. • Students are given a list of purchasable revision resources and class teachers will guide parents at parents evening to the ones that are most helpful for their child. • Students are guided to a wealth of online resources to help support their revision. For example: - Chem Guide • The morning of exams there are optional drop in sessions run by subject specialists focused on reinforcing key points for the specific exam of the day as well as boosting confidence.	**Formative Assessment:** • Teachers constantly assess students, (for example using questioning, mini-whiteboards, and short quizzes) and provide immediate verbal feedback during the lesson. **Summative Assessment:** • Year 13 students have test weeks in late October, mid-December and internal mock exams in late February. **Homework and Independent study:** • Student's complete tutorial questions for each topic, based on the content delivered in lesson and workshops where they apply their knowledge to exam-style questions. • Students complete write up and discussion of practical work in their lab book.

Subject Curriculum Overview for Academic Year 2022/2023

How parents can support learning in the subject this academic year

All students are provided with their own copy of a text book for home and study room use but there are a variety of other good resources available including revision note books and revision guides. Please contact your child's Chemistry Teacher if you would like any direction to appropriate resources that you could buy.
Students in the sixth form are set at least 6 hours of homework and independent study per week for each subject. In Chemistry A level this takes the form of:

- Tutorial questions
- Workshop booklets
- Lab book work
- Reviewing notes from lessons

Parents can support learning by ensuring that students use their free time effectively and are completing all of the homework and independent study. In the event that students are struggling with independent work it is helpful if the teacher can be contacted as soon as possible to enable them to support your child to catch up.

Recommended Reading

Students are provided with two text books to support their learning. However, students who are intending to study Chemistry or a Chemistry related course at university may wish to purchase/borrow the following books. Please note, that these books are fairly expensive and so it may be best to wait until you arrive at university before purchasing these books, to ensure that they are necessary for your course. Also, it can often be possible to purchase second hand copies that are in good condition for a good value.

- Chemistry^3: Introducing inorganic, organic and physical chemistry, Burrows, Holman, Parsons, Pilling, Price
- Physical Chemistry, P W Atkins, Oxford University Press
- Inorganic Chemistry, Shriver and Atkins, Oxford University Press
- Organic Chemistry, Clayden, Greeves and Warren, OUP

Points to note

Chemistry A level is assessed using three written exams at the end of Y13.

1. Paper 1 - Advanced Inorganic and Physical Chemistry makes up 30% of the final grade, is 1hr 45min long and includes content from topics 1,2,3, 4, 5, 8, 10, 11, 12, 13, 14 and 15
2. Paper 2 - Advanced Organic and Physical Chemistry makes up 30% of the final grade, is 1hr 45min long and includes content from topics 2, 3, 5, 6, 7, 9, 16, 17, 18 and 19
3. Paper 3 - General and Practical Principles in Chemistry makes up 40% of the final grade is 2hr 30min long and may draw on any of the topics in the specification

The assessment of practical skills is a compulsory requirement of the course of study for A level chemistry. It will appear on all students' certificates as a separately reported result, alongside the overall grade for the qualification. Students' practical work will be assessed by teachers, using common practical assessment criteria (CPAC) that are consistent across exam boards. Overall, a minimum of 20% of the marks across the three papers will be awarded for mathematics at Level 2 or above.