Roundwood Park School

A Level Chemistry (OCR Chemistry A)

The A Level Chemistry qualification is a content-led course designed to develop theoretical and practical chemistry skills, knowledge and understanding.
A flexible approach where the specification is divided into topics, each covering different key concepts of chemistry. Teaching of practical skills is integrated with the theoretical topics and they're assessed through written papers. The teaching of the course is split across the teachers, into the 2 main branches of Chemistry:

- "Inorganic and physical chemistry" – modules 2, 3 and 5
- "Organic chemistry" - modules 2, 4 and 6

The order of teaching largely follows that of the specification. It lends itself to building on the content taught at GCSE and by focusing on Module 2 at the beginning, allows students to bridge the gap from KS4 to KS5 successfully, especially as our students may have studied different course specifications at GCSE. On the 'Inorganic and physical' side of the course, the order of topics changes slightly from the specification, allowing the Year 12 equilibria topic (Chapter 10) to transition seamlessly into the Year 13 equilibria topic (Chapter 19) before going back to the year 13 rates topic (Chapter 18). This provides the opportunity to keep building on the Year 12 knowledge and make strong foundational links with the Year 13 content. This is especially important, given that the step-up in the difficulty of Chemistry from year 12 to 13 is quite significant. With a similar aim of smoothing the transition from year 12 into 13, on the 'Organic' side of the course, the first year 13 chapter will be carbonyl compounds (Chapter 26), before returning to Chapter 25 on aromatic compounds. This is a whole new branch of organic chemistry, so building confidence with the transition into year 13 is the top priority. Aside from these, the order of topics taught in Year 13 remains chronological, which enables students to further embed concepts learnt in Y12 and so is an important way to deepen their knowledge and understanding.

Building on the skills and concepts introduced at KS3, and KS4, the Chemistry curriculum extends the understanding of experimental design and embeds the application of mathematical skills as a fundamental concept. The learning habits included in the "Learning to Understand" quadrant of the ASPIRE board in particular strike a chord with the core values in Chemistry. Our students are given multiple opportunities to develop problem solving skills, through designing their own experimental methods to answer a given brief, as set out in OCR's practical endorsement activities. We encourage the students to think autonomously in these activities, by just providing them with a brief, not the full method. This goes above and beyond OCR's expectation of students are here at RPS we want to build academic resilience and simulate degree-level scenarios and expectations in this manner. This helps students improve their science

capital and they start to get an insight into workings of a science-based career. Given that the vast majority of our students pursue STEM or medical-related careers at university, this is a unique and beneficial approach to the practical aspect of the A Level course.

The OCR's A Level in Chemistry A specification aims to encourage learners to:

- develop essential knowledge and understanding of different areas of the subject and how they relate to each other
- develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
- develop competence and confidence in a variety of practical, mathematical and problem-solving skills
- develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject
- understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society (as exemplified in 'How Science Works' (HSW).

Year / term	Inorganic & Physical Chemistry – Units of work	Organic Chemistry – Units of work	Assessment
Year 12 Autumn Term	Chapter 2. Atoms, ions and compounds ● Atoms, ions, isotopes, Mr ● Formulae, balancing equations Chapter 3. Amounts of substance ● Mole calculations, Mr, hydrated salts ● Gas volumes, ideal gas equation ● Reacting masses, limiting reactants, % yield, atom economy ● *PAG # 1.3* Chapter 4. Acids and redox ● Acids and bases, titrations, making standard solutions, carbonates, redox ● *PAG # 2.3* Chapter 7. Periodicity ● periodic table, ionisation energies ● patterns in structure and bonding Chapter 8. Reactivity trends ● group 2, group 7, ion tests ● *PAG # 4.2*	Chapter 5. Electrons and bonding ● electron orbitals and subshells ● ionic and covalent bonding Chapter 6. Shapes of molecules and IM forces ● shapes of molecules, bond angles ● electronegativity and bond polarity ● intermolecular forces Chapter 11. Basic concepts of organic chemistry (first half only) ● Organic nomenclature, types of formulae ● Isomerism Chapter 12 & 13. Alkanes & Alkenes ● Alkanes – reactions, free radical substitution mechanisms ● Alkenes – stereoisomerism, reactions, electrophilic addition mechanisms, addition polymers and environmental impact	Into Year 12 Bridging assessment Chapters 2 & 3 assessment Chapters 5 & 6 assessment Chapter 4 assessment Chapters 7 & 8 assessment
Super Curricular	Read the book: Periodic Tales: The curious lives of the elements - Hugh Aldersey-Williams Watch / participate in the ChemCareers monthly webinar. Each month they have different guest speakers from different industries within chemistry. https://www.rsc.org/careers/chemcareers-webinars/#chemcareers-webinars-tab-inner		

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Year 12 Spring Term	<u>Chapter 9. Enthalpy</u> ● Enthalpy definitions, measuring enthalpy of combustion ● Bond enthalpy calculations ● Hess' law ● *PAG # 3.3 or PAG # 3.2* <u>Chapter 10 & 19. Equilibrium</u> ● Dynamic equilibrium ● Le Chatelier's principle ● Kc introduction ● Kc calculations ● Position of equilibrium <u>Chapter 10 & 18. Rates of reaction</u> ● Factors affecting rate of reaction ● Catalysis ● Boltzmann distribution <u>Chapter 10 & 18. Rates of reaction continued</u> ● Orders ● rate equation ● rate constant	<u>Chapter 11. Basic concepts of organic chemistry</u> (second part) ● Isomerism, <u>Chapter 12 & 13. Alkanes & Alkenes</u> ● Alkanes – reactions, free radical substitution mechanisms ● Alkenes – stereoisomerism, reactions, electrophilic addition mechanisms, addition polymers and environmental impact <u>Chapter 14. Alcohols</u> ● Alcohols – reactions, mechanisms ● *PAG # 5.3* <u>Chapter 15. Haloalkanes</u> ● Haloalkanes hydrolysis, reaction mechanisms, organohalogens and environmental impact <u>Chapter 16. Organic synthesis</u> ● Practical techniques, synthetic reaction routes ● *PAG # 6.1*	<u>Chapter 9 assessment</u> <u>Chapter 11 & 12 assessment</u> <u>Chapter 10 (equilibrium only) & Chapter 19 assessment</u> <u>Chapters 13, 14 & 15 assessment</u>
Super Curricular	Watch some videos made by the University of Nottingham's YouTube channel Periodic Videos about rare elements not discussed at A Level. They do cool experiments with cheeseburgers, alcohol shots, and look at a party trick called Pythagoras' cup. https://www.youtube.com/user/periodicvideos Read a book: Obsessive Genius: The Inner World of Marie Curie – Barbara Goldsmith		

Year / term	Inorganic & Physical Chemistry – Units of work	Organic Chemistry – Units of work	Assessment
Year 12 Summer Term	Chapter 18. Rates of reaction (second part) • Concentration time graphs • Rate-concentration graphs • Rate determining step • Arrhenius equation • *PAG # 9.3* • *PAG # 10.1 or PAG # 10.2*	Chapter 17. Spectroscopy • Mass spectrometry • infrared spectroscopy Chapter 26. Carbonyls and carboxylic acids • Testing for carbonyls, reaction mechanisms, carboxylic acids and their derivatives • *PAG # 7.2* *PAG 6.1 Synthesis of aspirin*	Chapters 16 & 17 assessment Chapter 10 (rates only) & Chapter 18 assessment YEAR 12 MOCK EXAMINATIONS Chapter 26 assessment
Super Curricular	Can we unravel the origins of life? look into the chemistry research that is challenging Darwin's theories of evolution. Start by reading the article here https://blogs.scientificamerican.com/the-curious-wavefunction/five-questions-that-should-keep-chemists-awake-at-night/ . produce a small project, PowerPoint or poster to educate other A Level chemists about this topic. Read the book: Disappearing Spoon - Sam Kean		

Year / term	Inorganic & Physical Chemistry – Units of work	Organic Chemistry – Units of work	Assessment
Year 13 Autumn Term	<u>Chapter 20. Acids, bases and pH</u> ● Acid and base conjugate pairs ● pH scale ● Ka and strong acids ● pH and weak acids ● pH and strong bases <u>Chapter 21. Buffers and neutralization</u> ● buffers ● buffers in the body ● neutralisation and pH curves ● *PAG # 11.2 or #11.3* *Preparation for mock examinations*	<u>Chapter 25. Aromatic Chemistry</u> ● Benzene nomenclature, reaction mechanisms, phenols, directing groups in reactions ● *PAG # 7.1 & 2* <u>Chapter 27. Amines, amino acids and polymers</u> ● introduction to amines ● reaction of amines ● amides ● condensation polymers ● polymer hydrolysis *Preparation for mock examinations*	<u>Chapter 20 assessment</u> <u>Chapter 21 assessment</u> <u>Chapter 25 assessment</u> <u>Chapter 27 assessment</u> <u>YEAR 13 MOCK EXAMINATIONS</u>
Super Curricular	Find a scientist in a field that interests you. Contact them to ask them about their work and career path. Have a go at the Royal Society of Chemistry's Chemistry Olympiad exam paper from 2021 (Round 1) and see how well you do! https://edu.rsc.org/resources/chemistry-olympiad-past-papers/1641.article		

Year / term	Inorganic & Physical Chemistry – Units of work	Organic Chemistry – Units of work	Assessment
Year 13 Spring Term	Chapter 22. Enthalpy and Entropy ● Lattice enthalpy ● Born-Haber cycles ● Enthalpies of hydration and solution ● Entropy ● Gibbs free energy Chapter 23. Redox and electrode potentials ● Redox reactions ● Iodine thiosulfate titrations ● Electrode potentials ● Fuel cells	Chapter 28. Organic synthesis ● Further practical techniques ● Increasing carbon chain length ● Further synthetic routes Chapter 29. Chromatography and spectroscopy ● Thin layer chromatography ● Gas chromatography ● NMR spectroscopy ● Carbon-13 NMR ● Proton NMR Chapter 24. Transition metals (taught by either teacher) ● d-block elements ● formation and shapes of complex ions ● stereoisomerism in complex ions ● ligand substitution and precipitation reactions ● redox and qualitative analysis	Chapter 22 assessment Chapter 23 assessment Chapters 28 & 29 assessment Chapter 24 assessment
Super Curricular	Read a book: H_2O: A biography of water - Phillip Ball Watch / participate in the ChemCareers monthly webinar. Each month they have different guest speakers from different industries within chemistry. https://www.rsc.org/careers/chemcareers-webinars/#chemcareers-webinars-tab-inner		

Year / term	Inorganic & Physical Chemistry – Units of work	Organic Chemistry – Units of work	Assessment
Year 13 Summer Term	• *PAG # 8.2* • *PAG 12.1 or 12.2* *Revision for final A Level examinations*	*Revision for final A Level examinations*	*Revision for final A Level examinations*
Super Curricular	Check out the Royal Society of Chemistry's career section - do some research on Chemistry-related career options that might be of interest to you. https://www.rsc.org/careers/career-decisions/ Look into some of the latest innovations in new materials. Produce an article about the material, its uses, costs and the science on a molecular level about why it is a good new material for the future.		