Subject Area: Chemistry

Curriculum Intent: To instil enthusiasm for science and to develop an interest in further study and careers associated with the subject, in the fields of medicine, engineering, environmental or other science related subjects. Through our courses we aim to equip our students with a detailed body of knowledge as well as help them build the skills required to make progress and achieve success in the scientific enterprise. A key aim is to make our students more powerful abstract, logical thinkers. Within the study of each our science courses, we enable students to develop and demonstrate a deep subject knowledge, an understanding of scientific methods, as well as develop competence and confidence in a variety of practical, mathematical, research, analytical and problem-solving skills. We also aim to extend the cultural capital of our students by increasing their scientific literacy and engagement in discussion and critical evaluation of science in the media. We aim to equip them with an understanding of the interplay between science, technology and society, the role that scientists have had in creating problems and mitigating impacts, as well as how the sciences contribute to the success of the economy and society. Complementary to this, sits our commitment to embed both the academy's professional standards and sense of civic virtue: our aim is for students to understand varying viewpoints of the scientific enterprise as well as consider the consequences and integrity of decisions and actions that they take as scientists, as individuals, and as a community, on the environment, on themselves and on others.

Dates	Content	Assessment	Rationale
Term 1	2.1.1 Atomic structure and isotopes 2.1.2 Compounds, formulae & equations 2.1.3 Amount of substance 2.1.4 Reactions of acids & Acid-base titrations 3.1.4 Qualitative Analysis 2.2.2 Bonding & Structure (part) *to cover ionic bonding, covalent bonding & shapes of molecules* CEIAG: Career pathways in analytical chemistry	PC1 Assessment: Past exam questions covering 2.1.1, 2.1.3 and 2.1.4 PAG 1.2 Determination of Relative Atomic Mass of Magnesium PAG 2.1 Determination of Concentration of Hydrochloric Acid	This terms work acts as an important bridge into A Level Chemistry from the study of chemistry within science courses at GCSE level. It provides students with a knowledge and understanding of the important chemical ideas that underpin the study of A Level Chemistry; consequently, the teaching order of the course predominantly follows the syllabus order as this introduces chemical knowledge and ideas in a logically coherent way. Much of the first terms work (2.1.1, 2.1.2, 2.1.3, 2.2.2) builds on work that has been introduced at GCSE and teaching 2.1.3 early raises the level of cognitive challenge, increases the mathematical demand, and more fully introduces them to the rigour of A level study. Module 3.1.4 is also covered in this terms as it links to the work done in 2.1.2, extends qualitative chemistry for those who studied GCSE chemistry and is a good introductory point for those who studied GCSE Science. 2.2.2 is split into the sections that review GCSE work on bonding (covered here) and the section on electronegativity which benefits being taught after 2.2.1
Term 2	2.2.1 Electron structure 3.1.1 (part) Periodic trends in ionisation energies 2.2.2 (part) Electronegativity & bond polarity, intermolecular foces 2.1.5 Redox 3.1.2 Group 2 3.1.3 Group 7	PAG 4.2 Identifying Unknowns	The thrust for this term is to develop a deeper understanding of the arrangement of electrons around the atom. Linking the work done in 2.11 to 3.1.1 enables students to build a more nuanced understanding of the periodic table, linking our understanding of electron structure to the evidence presented through ionisation energies. Section 2.2.2 logically follows on from this, as the ideas underpinning an understanding of ionisation energies also support the work done on electronegativity. Introducing section 3.1.1 enables a full elucidation of the link between structure and bonding and the periodic table and enables a more synoptic perspective to be developed. Similarly, teaching redox followed by group 2 and group 7 enables a review of work done in 2.1.4 to be integrated and a fuller understanding of the periodic table to be developed.
Term 3	3.2.1 Enthalpy changes 4.1.2 Alkanes (and relevant 4.1.1 Basic concepts) 4.1.3 Alkenes (and relevant 4.1.1 Basic concepts)	PAG 3.3 Determination of Enthalpy Changes of Combustion PAG 3.2 Determination of an enthalpy change of reaction by Hess' Law	The syllabus is designed to introduce elements of physical chemistry in a particular order: enthalpy changes, rates, and then equilibria and the teaching of physical chemistry remains distinctly split into these topics. They are taught in this order but spilt over terms 3, 4 and 5 as this facilitates spaced repetition of content to embeds practice. Delivery of equilibria as the last component of physical chemistry enables rates, catalysts and equilibria to be reviewed synoptically as a way of increasing yield and reducing energy demand, improving the sustainability of industrial processes.
Term 4	4.2.1 Alcohols (including hydrogen bond revision) & 4.2.3 (part) Organic Synthesis - practical Skills 4.2.4 Analytical Techniques 3.2.2 Reaction Rates CEIAG: Career pathways in organic chemistry PS/CV's: Discussing the responsibility that chemists have in developing technologies that can be beneficial as the responsibility to deal with unintended outcomes (eg CFCs)	PAG 5.3 Oxidation of Alcohols	Module 4 (core organic chemistry) assumes knowledge and understanding of the chemical concepts developed in Module 2. Section 4.1.1 contains a number of abstract concepts that are better understood in context and so, for this reason, the teaching of this section is integrated into the teaching of 4.1.2, 4.1.3, 4.2.1 and 4.2.2. The organic chemistry section is generally taught in syllabus order as this allows for concepts and nomenclature to be introduced in a coherent and logical way. Practical skills are included at appropriate points to underpin the work being done and this also requires the teaching of section 4.2.3 alongside other content (e.g. reflux and distillation are introduced in the context of oxidation of alcohols). Teaching analytical techniques (4.2.4) after 4.2.1 enables a context to be given to these techniques and offers the opportunity to understand these techniques as a tool to elucidate structures of unknown compounds (synoptically tested in Paper 2 of the A level course).
Term 5	4.2.2 Haloalkanes 3.2.3 Chemical Equilibrium Revision Titration Calculations Revision (3.1.4 Qualitative Analysis) Organic Revision - 4.2.3 Synthetic Routes Revision enthalpy changes PS/CV's: Impacts of energy usage on the environment and the need to preserve and value raw materials	PAG 4.1 Identifying Unknowns (as necessary) PAG 2.3 Identifying unknown carbonate (as necessary)	Having completed the three areas of physical chemistry it is now possible to test these in a more synoptic way with enthalpy changes, rates, catalysts and equilibria being considered as a way of increasing yield and reducing energy demand, improving the sustainability of industrial processes. This is taught at the end of the section on chemical equilibrium and also acts as a useful method for revising the physical chemistry topics taught earlier. In preparation for the PC of next term, in addition to general revision in response to student need, extra emphasis is placed on developing more holistic knowledge and understanding of organic chemistry through 4.2.3

Term 6	Revision work for Breadth and depth in Chemistry papers 5.1.2 How Far? (Part - to include calculation of Kc when only one equilibrium amount given) 5.2.1 Lattice enthalpy 5.1.3 How Fast		Module 5 content links with Modules 2 & 3 and is tested on Paper 1; consequently, in order to help make clear synoptic links module 5 is delivered in its entirety before embarking on module 6. This also enables spaced repetition of module 2, 3 and 5 content throughout the year. There is an emphasis on calculation work with the material covered in these topics before summer as this quickly brings the students up to answering A level standard questions and so builds confidence. 5.1.2 is taught first as this extends the work done in 3.2.3.

Dates	Content	Assessment	Rationale
Term 1	5.1.3 How Fast 5.1.2 How Far (with treatment of Kp) 5.2.1 Lattice Enthalpy 5.1.3 Acids, Bases and Buffers (not titration curves) 5.2.2 Enthalpy and entropy	PAG 10.2 Initial Rates methods PAG 9.3 Magnesium and HCl PC1 Assessment: Past exam questions	These three topics are reviewed again at the beginning of year 13. How far is extended to discuss why Kp remains constant when pressure is constant. The work on rates is extended into Arhenius equation and lattice enthalpy reviews earlier work and continues to enthalpies of solution and hydration. Other rates work is reviewed in the context of developing practical skills. 5.1.3 is taught this term and not split as the mathematical methods taught here benefit from continual links being made between them. It also enables students to be presented with exam questions and forces them to decipher which part of the topic is being examined. 5.2.2 enables links to be made to 5.2.1
Term 2	5.2.3 Redox and Electrode Potentials 5.1.3 Titration Curves 5.3.1 Transition Elements 6.1.2 Carbonyl compounds & Module 4 review	PAG 8.3 Electrochemistry PAG 11.2 Titration curves PAG 12.1 Iron tablets PC2 Assessment: Past exam questions for Paper 1	This content of this section is taught in syllabus order as the work is the foundation for redox titration and electrode potentials. 5.1.3 acids, bases and buffers is revisited and extended into discussion of titration curves with associated PAG work. 5.3.1 Is the final part of this module and acts as a synoptic link with redox titration work as well as qualitative analysis from year 12. The teaching of organic chemistry needs to be done in a way that enables students to build up an holistic picture of the subject: links between different sections need to be constantly made. Carbonyl compounds are the first to be taught, followed by carboxylic acids, as this links with the work done in year 12 on oxidation of alcohols and facilitates a review of this section of the syllabus before comparing oxidation and reduction reactions.
Term 3	6.1.3 Carboxylic Acids and Esters 6.1.1 Aromatic Compounds & 6.2.5 Organic synthesis (practical techniques) 6.2.1 Amines 6.2.2 Amino Acids, Amides and chirality 6.2.3 Polyesters and Polyamides 6.3.1 Chromatography 6.3.2 Spectroscopy	PAG 6.1 Synthesis of Aspirin PC3 Assessment: Past exam questions for Paper 1	The work on esters again links to carboxylic acids and alcohols and helps build up the map of synthetic organic chemistry. 6.1.1 is followed by 6.2.1 as this enables a perspective of synthetic routes in aromatic chemistry to be developed. Spectroscopy is introduced at the end of this term as it allows space to practise these skills over the remains of the course with spaced repetition of exam questions linking spectral analysis to synthesis.
Term 4	6.3.1 Qualitative Analysis 6.1.3 Acyl chlorides and acid anhydrides (to include synthesis revision for esters and amines) 6.2.4 Carbon-carbon bond formation & 6.2.5 Organic synthesis (mechanisms and reaction pathways)	PAG 7.2 Identifying unknown (organics) PC4 Trial Examination: Past exam questions for Paper 2 (and 3 as appropriate)	The content of sections 6.3.1, 6.2.4 & 6.2.5 have been layered into each relevant topic (already taught) so this term acts as a thematic overview of synthetic routes for the whole of organic chemistry covered at A level as well as a review of qualitative testing and spectroscopic interpretation. Teaching Acyl chlorides and acid anhydrides now reduces perceived complexity earlier in the course and enables students to see patterns in organic synthesis.
Term 5	Acids Bases and Buffers revision Electrode potentials and Redox Titration revision Organic Revision (synthetic routes & mechanisms) Revision and past paper work for papers 1, 2 and 3	Extra PC Assessment: Past exam questions for Paper 3	
Term 6		External examinations	

PS/CV's: Discussion relating to the moral ambiguities of the role of chemists in developing explosives and illegal drugs