KAA Curriculum Overview	Chemistry	Year 12	EOY Exam	Sequencing and Progression	
Rationale *Give an overview of what students are studying this year and why. Link directly to your overall curriculum intent.* *In broad terms Chemistry at KS5 is the study of the movement of electrons:* *How many?* *Why do they move?* *How do they move?* *And the resulting changes in energy and configuration.* *In year 12 our students learn the core concepts of: how to quantify the amount of any chemical; how to quantify the rate or energy change of a given reaction; how to name molecules systematically; and how to test for common substances or ions. Students also begin to develop knowledge of how reactions take place and the analysis techniques used to identify compounds by mass or detect different functional groups. Trends in physical and chemical properties across periods and down groups of the periodic table are discussed and explained, with reference to atomic structure and electron configuration.* *Students will learn and develop a significant set of practical skills related to carrying out, recording, and reflecting on a series of experiments designed to fit in with the curriculum. These include: quantifying the exact amount of an acid needed to react with a base, quantifying accurately the heat energy released in a set of reactions, and identifying the ions present in samples using test tube reactions.* *Through the above we aim to ensure that all students have an excellent foundation for studying the physical / medical / life sciences or engineering. Or that students have an excellent foundation for entering work or an apprenticeship in a science or engineering setting.*			*What content and skills will be assessed in the EOY exam?* *All topics listed below. The key skills are multi step calculations and deductive reasoning.* *Link to model exam papers here.* *See for example:* *https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2019/june/AQA-74041-QP-JUN19.PDF* *https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2019/june/AQA-74042-QP-JUN19.PDF*	*How does this year build on what they've learnt last year?* *The topics at A-level are an elaboration of the GCSE Chemistry content. There is also now a stronger overlap of content and skills from separate topics.* *For example when students study equilibrium in Year 12 they are introduced to the equilibrium constant and are expected to use moles calculations to find the amounts of substances at equilibrium.*	*How will it benefit them as they move forward next year?* *The biggest benefit will be in being able to apply quantitative calculations to a range of different situations.* *A deep understanding of how electrons are configured in atoms, ions, and every type of bond is also important.*

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Sum 1	Sum 2
Link to MTP Overview						
Topic studied & Fertile Question	**Atomic structure** How are electrons configured in an atom or ion? **Amount of substance** How can we quantify how many atoms or ions or particles we have in a sample? **Bonding** How are electrons configured in molecules and compounds? **Introduction to organic chemistry** How do you know what Z-pent-3-en-1-ol looks like?	**Kinetics** How quickly do reactions happen and why? **Energetics** How is energy transferred when reactions happen? **Alkanes** How reactive are C-C and C-H bonds? Why? **Halogenoalkanes** How do electrons move in a C-X bond? Why?	**Equilibrium** How does an equilibrium system and the substances within it change under different conditions? **Redox** How can we specifically identify electrons moving in reactions? **Alkenes** Why is a C=C bond more reactive than a C-C bond? **Alcohols** What can be made from an alcohol?	**Periodicity** How does adding a shell/proton/electron affect the physical properties of the elements down a group or across a period? **Halogens** Why are halogens, halogen compounds, and halides so reactive? **Alkali earth metals** What are the trends in physical and chemical properties of compounds of group 2 metals? **Organic analysis** How can test tube reactions, spectroscopy, and spectrometry be used to identify functional groups and ions?	Re-teaching of key concepts. Exam technique and refinement.	**Kinetics A2** How does the rate equation linked to activation energy? **Nomenclature and isomerism A2** Why do some compounds show optical activity? **Compounds containing the carbonyl group A2** How does the C=O bond react? Why?

Adjustments following last assessments / evaluation.	Support the decisional knowledge of students in: when to talk about bonding and when to talk about intermolecular forces in questions about boiling points. Use core questions to support learning definitions and standard responses. Scaffold for how to *present* solutions to multi step calculations.	Model the use of cycles and enthalpy diagrams to better prepare students for thermodynamics. Use dual coding for mechanisms.	Use dual coding for mechanisms. Scaffold for how to *present* solutions to multi step calculations, eg in Kc questions.			Use algebra to solve orders of reactants $\frac{Rate_1}{Rate_2} = \left(\frac{[A]_1}{[A]_2}\right)^a \left(\frac{[B]_1}{[B]_2}\right)^b$ Use dual coding for mechanisms.
Key knowledge and skills students need to have gained by the end of the unit	How to deduce the electron configuration of an atom or ion using the periodic table. How a mass spectrometer works. How to calculate the mass of an ion, its time of flight or speed through a mass spectrometer, or the length of a flight tube. How to use Avogadro's number, moles, molar mass, mass, concentration, and volume to calculate amounts of substances. Describe the main types of bonding and intermolecular forces and explain how they arise using ideas around electronegativity and polarity. How to apply IUPAC rules to name a molecule. Define and identify the different types of isomers.	Draw, label, and interpret a Maxwell-Boltzmann distribution of energies among particles. How to use Hess's law to calculate an enthalpy value from data. Recall and explain the steps in free radical chain reactions and explain their significance to the environment. Draw and explain the mechanisms of nucleophilic substitution and elimination in halogenoalkanes.	Apply Le Chatelier's principle to systems at equilibrium. Calculate changes in amounts, and the equilibrium constant, from data. Deduce and combine half equations from written information. Draw and explain the mechanisms of electrophilic addition across a carbon double bond. Describe and explain experimental details of the oxidation of primary and secondary alcohols.	Explain how and why atomic/ionic radii and ionisation energies change across a period and explain exceptions to these trends. State the reactions of halogens and halides and describe any observations associated with these reactions. Describe the trends in solubilities of group 2 sulfates and hydroxides. Describe tests and observations for negative ions (halides, sulfate, hydroxide), and give the ionic equations for these tests. Describe tests and observations for functional groups (alkenes, alcohols, aldehydes, carboxylic acids). How to identify a carbonyl/hydroxide/alkene from an IR spectrum. How to find an M_r / deduce fragments of a molecule from a mass spectrum. How to combine chemical test and spectroscopic information to identify a species.		Solve the rate equation from data. Use initial rates data and rate concentration graphs to solved orders of reactants. Determine the rate determining step of a multistep reaction. How to use the Arrhenius equation and graph to deduce activation energy. How to apply IUPAC rules to name a molecule. Describe the effect of separate samples of pairs of enantiomers / a racemic mixture on plane polarised light. Draw and explain the mechanisms of nucleophilic addition to asymmetric ketones and aldehydes. Write equations for the formation of soaps and biodiesel from esters. Draw and explain the mechanisms of base hydrolysis of an ester.

						Draw and explain the mechanisms of nucleophilic addition elimination in acid derivatives.
How is understanding assessed at the end of the unit?	Written assessment where students are asked many questions which require definitions, descriptions, explanations, deductions, and calculations, all done under timed conditions. Assessments are marked by teachers using set mark schemes, to award a % and grade. Practical work is assessed through reports on each experiment, written in a lab book. The reports are marked by teachers using a R/A/G system based on competencies shown by students.					