Curriculum Map KS5 Chemistry

Autumn Term Year 12	Atomic Structure, Isotopes and Formulae	Amount of Substance	Acids and Redox	Electrons and Bonding	Shapes of Molecules and intermolecular forces
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Ref 2.1.1. This is the introduction unit for the course and extends from GCSE chemistry. (Chapter 2) The topics covered are: The structure of the atom Isotopes Finding the relative atomic/isotopic mass using mass spectrometry Writing formulae for ionic compounds Learn common formulae for ions and their names Taught by teacher 1 and 2	Ref 2.1.3 This is a calculation-based unit. It again, builds on the topics taught at GCSE and extends them. Define the mole, molar mass, molar gas volume. Calculate: Mass/moles/ Mr Use the molar gas volume/moles/ volume formula. Empirical formula Water of crystallisation Percentage composition Reacting masses Use the formula PV=nRT Find % yield and atom economy. Use the triangles: Techniques and practical procedures for calculating measurement of mass, volumes of solutions and collecting gas. Taught by teacher 1	Ref 2.1.4 and 2.1.5 Another calculation-based unit but incorporates the theory of acids, bases and salts. This is the first introduction to oxidation numbers. Students will: Name common acids, bases and salts Define weak and strong acids. Neutralisation reactions including *ionic equations.* Make a standard solution. Practise titrations and equations Calculate volume, concentrations and moles in a solution. Assign the oxidation numbers of elements, compounds and ions Identify redox reactions and which species is oxidised and reduced using oxidation number Identify the oxidising and reducing agents. Taught by Teacher 2	Ref 2.2.2 Following on from writing formulae and looking at ionic molecules the students are now introduced to bonding. Topics include Drawing dot and cross diagrams for ionic and covalent compounds Ionic Bonding Describe and explain giant ionic lattices and properties including melting point, conductivity and strength Consider covalent compounds and the properties of giant and simple structures Multiple covalent bonds and dative covalent bonds Define the average bond enthalpy definition and the strength of the bond What effects the boiling point? Taught by Teacher 1	Ref 2.2.2 This topic builds on bonding and now looks at shapes of molecules and the forces of attraction between molecules. During this topic we will consider: The shapes of molecules using the electron pair repulsion theory Explain how the shapes form. The shapes we look at are linear, non-linear, trigonal planar, pyramidal, tetrahedral and octahedral *(including bond angles for common examples of each shape including:*CH_4 *(109.5°),* NH_3 *(107°) and* H_2O *(104.5°))* Define electronegativity and bond polarity. Polar and non-polar molecules Explain hydrogen bonding and how this explains the anomalous properties of water. . Taught by Teacher 1
Skills- What will be developed?	This is the first opportunity to do a practical endorsement activity known as a PAG PAG 1.2 Determination of the relative atomic mass of magnesium This involves follow written instructions; recording data; accurately reading scales; safely use a range of practical equipment & materials; present information and data in a scientific way.	Another opportunity to build practical skills PAG 1.3: Determination of the formula for magnesium oxide This involves follow written instructions; recording data; accurately reading scales; safely use a range of practical equipment & materials; present information and data in a scientific way. It builds on the previous PAG	Practical skills include titration and making standard solutions. This is an opportunity to carry out the practical work and make the calculation work concrete. PAG 2.1 Determination of the concentration of HCl PAG 2.2 Determination of the molar mass of an acid	Use of ideas about ionic bonding to explain macroscopic properties. Draw 3-D diagrams to illustrate shapes of molecules and ions.	Using electron pair repulsion theory to predict molecular shapes Using ideas about electronegativity to predict chemical bond type. Dipole interactions as a model to explain intermolecular bonding.
Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes/concepts will be explored?	The key themes are: - What is an atom and how do different atoms differ - What is a compound and how can these be represented as formulae. - how can we detect them using mass spectroscopy	The key themes for this unit are: - how do I calculate reacting volumes and/or predict the gas I expect to obtain in a reaction. This is an essential element of quantitative chemistry.	The key themes for this unit are: **What makes lemons sour?** - What is an acid, alkali and salt? - How can I calculate the concentration of a solution?	What keeps molecules together? What affects the melting point of ionic compounds?	Why is water an anomalous liquid? What affects the melting and boiling point?
SEND- how will support be seen? Seating plans? Simplified questions?	All students are given a summary booklet with key words, mindmaps and notes. This helps organisation. Irlen's colours are used. Calculations are scaffolded. Glossaries in the end of topic booklets support overlearning of key vocabulary Long term memory aided by use and access to UpLearn for recall quizzing	All students are given a summary booklet with key words, mind maps and notes. This helps organisation. Irlens colours are used. Calculations are scaffolded. Glossaries in the end of topic booklets support overlearning of key vocabulary Long term memory aided by use and access to UpLearn for recall quizzing	All students are given a summary booklet with key words, mind maps and notes. This helps organisation. Irlens colours are used. Calculations are scaffolded. Glossaries in the end of topic booklets support overlearning of key vocabulary Long term memory aided by use and access to UpLearn for recall quizzing	All students are given a summary booklet with key words, mind maps and notes. This helps organisation. Irlens colours are used. Calculations are scaffolded. Glossaries in the end of topic booklets support overlearning of key vocabulary Long term memory aided by use and access to UpLearn for recall quizzing	All students are given a summary booklet with key words, mindmaps and notes. This helps organisation. Irlens colours are used. Calculations are scaffolded. Glossaries in the end of topic booklets support overlearning of key vocabulary Long term memory aided by use and access to UpLearn for recall quizzing
Assessment- What? Why? Progress checks are formative and assessments are summative	End of Unit Assessment which includes multiple choice and long answer question. A gentle start to the assessment process.	Booklets are given out Amount of substances 1 and 2 There is also an assessment at the end of the unit.	Booklets are given out Amount of substances 3. There is also an assessment at the end of the unit.	Practice end of chapter topic made from legacy questions. End of topic assessment	Practice end of chapter topic made from legacy questions. End of topic assessment End of module exam and mock

Curriculum Map KS5 Chemistry

What **memory for learning** skills will be required- modelling? Concrete answers? Retrieval?	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. Retrieval of ionic compounds from GCSE	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. Use of UpLearn	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.
Literacy- reading, extended accurate writing and oracy opportunities	Identifying differences between similar sentences. Matching key words and definitions. Reordering sentences for meaning using process words. Translating audio-visual data to diagrammatic form. Learning definitions accurately.	Learning definitions accurately. Reading and interpreting practical instructions	Recognising naming conventions for compounds and ions. Describing redox in terms of electron transfer, change in oxidation state. Comparing definitions of redox.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately
Numeracy/computing skills	Arithmetic: numbers of sub-atomic particles. Ratios, fractions and percentages in mass spectrometry calculations. Arithmetic, weighted mean in relative atomic mass determination. Translation between graphical, numerical and algebraic forms of data in analysis of mass spectra.	Change the subject of equations for percentage composition and mass composition calculations. Substitute into and solve algebraic equations for anhydrous and hydrated salts. Use ratios to construct and /or balance equations. Use an appropriate number of decimal places and significant figures in calculations.	Recognition and use of appropriate units for solution volume and concentration. Convert between units as part of volumetric calculations. Use an appropriate number of decimal places and significant figures in mole calculations.	Calculating percentages	Translate information between graphical and numeric form such as considering properties and size of molecule. Use angles and shapes in regular 2-D and 3-D structures.
Character development	Students explain why data is needed to answer scientific questions, and why it may be uncertain, incomplete or not available. They are encouraged to outline a simple ethical RESPECTFUL argument about the rights and wrongs of a new technology.	Students work together and develop teamwork during practical work. RESILIENCE is needed when doing the calculations. This is a first hurdle and students are encouraged not to fall but to ask for help and use the model answers to help them.	RESILIENCE is needed This unit allows more abstract ideas to become more concrete. Also refer to Gilbert Newton Lewis (see Bonding on right). https://sciencehistory.org/education/scientific-biographies/gilbert-newton-lewis/#:~:text=American%20chemist%20G.%20N.,the%20theory%20of%20covalent%20bonding.&text=The%20subject%20of%20chemical%20bonding,electrons%20shared%20by%20two%20atoms.	Gilbert Newton Lewis (also linked to acids and bases) showed RESILIENCE as he produced the theory of covalent bonding in 1916 (in the middle of WW1) and further theories around acids and bases. He was nominated for the Nobel Prize for chemistry 35 times but never won, yet despite this, he continued his work on chemical theories that now underpin many facets of A level chemistry. https://sciencehistory.org/education/scientific-biographies/gilbert-newton-lewis/#:~:text=American%20chemist%20G.%20N.,the%20theory%20of%20covalent%20bonding.&text=The%20subject%20of%20chemical%20bonding,electrons%20shared%20by%20two%20atoms.	Students can be invited to consider the new materials that have been designed due to our knowledge of bonding and alloys and the benefits and problems that these new materials have/can cause. Students are also invited to consider the RESILIENCE that allowed failures to be turned into success (Post-It notes arose from the development of a failed attempt at a super-glue into a new product that was profitable!) https://ideawake.com/post-it-notes-employee-idea-that-was-originally-mistake/#:~:text=The%20Post%2Dit%20Note%20Was,easily%20be%20removed%20without%20residue.
Equality/Diversity opportunities	*Link to James Harris (nuclear chemist)* https://en.wikipedia.org/wiki/James_Andrew_Harris	Meet Tom Welton, RSC president, ionic liquid guru and vocal advocate for inclusion and diversity in the chemical sciences *https://edu.rsc.org/scientists-in-their-element/i-went-on-my-first-anti-racism-march-when-i-was-14/4012453.article*	Be aware of acid attacks and the debilitating effects of these https://www.actionaid.org.uk/our-work/vawg/acid-attacks	**Kenichi Kukui** - Born in Nara, Japan, he was the first Asian recipient of a Nobel Prize in Chemistry. Kenichi was co-recipient along with Ronard Hoffman for his roles on orbitals. His interest was in quantum mechanics, in particular Schrodinger https://www.nobelprize.org/prizes/chemistry/1981/fukui/facts/	Dorothy Hodgkin was awarded the 1964 Nobel Prize in Chemistry for solving the atomic structure of molecules such as penicillin and insulin, using X-ray crystallography This is how we know the shapes of molecules https://www.nobelprize.org/womenwhochangedscience/stories/dorothy-hodgkin https://sciencing.com/importance-hydrogen-bonding-2514.html article on H-bonding
Homework/Independent learning	An independent Learning task in given on the structure of the atom which involves researching, summarising and note-taking activities. Inaddition, they are expected to complete the GCSE- A level transition work. Legacy questions to complete	Amount of Substance 1 and 2 booklets Legacy questions to complete Oxford Exam Style Questions	Amount of substance booklet 3 Oxford Exam Style Questions	Legacy questions to complete Oxford Exam Style Questions	Legacy questions to complete Oxford Exam Style Questions Research task on Dorothy Hodgkins INCLUDING full Harvard referencing.
CIAG coverage/links *Careers in chemistry*	Radioactive waste consultant https://edu.rsc.org/job-profiles/radioactive-waste-consultant/4013774.article	Chemical Engineer https://www.srgtalent.com/career-advice/roles-in-focus/chemical-engineering Production chemist: https://www.zippia.com/production-chemist-jobs/what-does-a-production-chemist-do/	Analytical chemist for Thames Water https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	Chemical engineering Senior principal scientist https://edu.rsc.org/job-profiles/senior-principal-scientist/4015672.article	Work in the chemical industry Pharmaceuticals https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article

Curriculum Map KS5 Chemistry

Spring Term Year 12	Periodicity	Reactivity Trends	Enthalpy	Basic concepts of Organic Chemistry	Alkanes	Alkenes
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Ref 3.1.1 This topic consider Mendeleev's periodic table and the trends in groups and periods. We will extend our understanding of structure and bonding. It includes: Classifying elements as both metal and non-metal Introducing Ionisation energies across a period and down a group Looking a the changes in structure and bonding as we go across a period and how this affects the conductivity, melting point and solubility Taught by Teacher 2	Ref 3.1.12; 3.1.2; 3.1.3 and 3.1.4 Physical and chemical trends The chemistry of Group 2 The chemistry of group 7 Qualitative tests for cations and anions. Taught by Teacher 2	Ref 3.2.1 This is the first physical chemistry topic and students learn about the importance of enthalpy changes, their uses and determination from experimental results including enthalpy cycles The topics include: Exothermic and endothermic reactions Using Hess' cycle and calculations to find Bond enthalpies, use enthalpies of formation and combustion. Finding the enthalpy of solution and combustion using experimental methods. Taught by Teacher 1	Ref 4.1.1 This is the introduction to Organic Chemistry The Unit includes: Nomenclature of organic compounds Representing organic compounds as molecular, displayed, structural and skeletal formula Isomerism in organic compounds Introduction to reaction mechanisms and the use of curly arrows to demote movement of electrons. Taught by Teacher 1	Ref 4.1.2 The first and most simple of the homologous series is investigated. The topic includes: The bonding in alkanes including the term sigma bonds The shape of alkanes Variations in boiling points and the effect of branching Chemical reactions of the alkanes The bromination of alkanes using radical substitution. Taught by Teacher 1	Ref 4.1.3 This topic includes: The structure and properties of alkenes The nature of the double bond Stereoisomerism Reactions of alkenes including electrophilic addition and the Markovnikov rule. Polymerisation of alkenes Biodegradable and photodegradable polymers. Taught by Teacher 1
Skills- What will be developed?	Meeting deadlines. Working safely and assessing risks.	Working with a range of partners. Organising practical work. Practical skills are developed in this unit particularly involving analytical chemistry. PAG 4.2 involves research, referencing and working safely in a practical PAG4.2 Identifying unknowns (2)	Teamwork: Working with a range of partners. Organising practical. Meeting deadlines. Working safely and assessing risks. Health and safety regulations CLEAPS There is also a range of practical tasks and PAGs to complete PAG 3.2 Determination of an enthalpy change of reaction by Hess's Law PAG3.3 Determination of an enthalpy change of combustion Application of the principle of conservation of energy to determine enthalpy changes There are opportunities for carrying out experimental and investigative work..	The skills in this topic are specific to organic chemistry specifically the use of systematic nomenclature to avoid ambiguity and recognise the role of IUPAC in developing a systematic framework for chemical nomenclature. Naming organic compounds is a skill and will now be built upon through the organic topics. Drawing out the molecules in different ways such as structural, displayed and skeletal.	Use of reaction mechanisms to explain organic reactions. Use of model of orbital overlap to explain covalent bonding in organic compounds. Use of ideas about enthalpy and polarity to explain macroscopic properties of alkanes.	Use of the model of orbital overlap to explain covalent bonding in organic compounds. Use of stability to explain products of organic reactions. Benefits of cheap oil-derived plastics counteracted by problems for the environment of landfill; the move to re-using waste, improving the use of resources. Benefits of reduced dependency on finite resources and alleviating problems from disposal of persistent plastic waste.
Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes/concepts will be explored?	What keeps molecules together?	Why is water an anomalous liquid ? What affects the boiling point of solids?	Why do reactions not always give out heat?	What is organic chemistry?	Why shouldn't you light a barbecue in a tent? What is an alkane?	What is an alkene?
SEND- how will support be seen? Seating plans? Simplified questions?	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.
Assessment- What? Why? Progress checks are formative and assessments are summative	The story of Mendeleev is recounted again. A greater appreciation of the Periodic Table can now be enjoyed. Practice end of chapter topic made from legacy questions. End of topic assessment	Students have previously met Group 1 (not 20 and the Halogens. They build on this previous knowledge. Practice end of chapter topic made from legacy questions. End of topic assessment	Practice end of chapter topic made from legacy questions. End of topic assessment	Practice end of chapter topic made from legacy questions. End of topic assessment	Practice end of chapter topic made from legacy questions. End of topic assessment	Practice end of chapter topic made from legacy questions. End of topic assessment

Curriculum Map KS5 Chemistry

What **memory for learning** skills will be required- modelling? Concrete answers? Retrieval?	Retrieval quizzes throughout starters, model answers within PPTs, progress checks.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks.	Links to Energy Changes in GCSE. Revisiting some terms and bond enthalpies. Retrieval quizzes throughout starters, model answers within PPTs, progress checks.	This links from a GCSE topic Organic Chemistry where carbon compounds were first introduced. Retrieval quizzes throughout starters, model answers within PPTs, progress checks. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO	This topic links with an earlier topic, Students recall the shape of a tetrahedral molecule and the bond angles. The modelling helps to provide a more concrete example. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO	Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO
Literacy- reading, extended accurate writing and oracy opportunities	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Explain the formation of a dipole using the concept of electronegativity. Summarize key point Explain the formation of hydrogen bonds and London forces using correct vocabulary. Identify key terms as marking points from exam mark scheme	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Constructing descriptions using key words. Learning definitions accurately.	Constructing descriptions using key words. Learning definitions accurately. Constructing a flow diagram for the reaction	Constructing descriptions using key words. Learning definitions accurately.
Numeracy/computing skills	Calculating percentages	Looking for tends in data and on graphs. Describing patterns and trends, including conflicting examples Translate information between graphical, numerical and algebraic forms	Translate information between graphical and numeric form such as considering properties and size of molecule. Quantitative Substitute numerical values into algebraic equations using appropriate units for physical quantities. Recognise and use expressions in decimal form. Recognise and use expressions in standard form. Use an appropriate number of significant figures.	Molecular modelling kits are be used to help learning. Students can be shown (or make) long molecules, and then draw out the displayed, structural and skeletal formulae of the compounds. Practising 'chemistry counting' To represent any molecule on paper involves creating a 2-D representation of a 3-D shape.	To represent any molecule on paper involves creating a 2-D representation of a 3-D shape. Identifying trends in data Calculations involving, moles, predicted masses and percentage yields	Calculations involving, moles, predicted masses and percentage yields
Character development	Mendeleev is an example of RESILIENCE in the face of adversity and AMBITION in his mother for him.	Students need to be RESOURCEFUL in applying existing knowledge to new contexts/examples of elements in groups that are not usually studied e.g. applying trends in group 7 to the recently discovered element TENNESINE.	RESILIENCE on calculating bond energies as this is common knowledge to A level Chemistry Gilbert Newton Lewis (see earlier) and Josiah Willard Gibbs, who worked with Lewis but was only slowly recognised for his work.	RESILIENCE this is a new topic so new language.	Empathy and COMPASSIONATE/RESPECTFUL by considering the environmental impact of the oil industry around the world.	Students are also invited to consider the RESILIENCE that allowed failures to be turned into success (Scientists had been working for many weeks on the development of poly(ethene) without success, until equipment was left dirty overnight. The next day, the process worked
Equality/Diversity opportunities	Meet 2 unknown women behind the periodic table: **https://norwegianscitechnews.com/2019/04/the-women-behind-the-periodic-system/**	Indiscriminatory nature of chlorine gas https://www.theworldwar.org/learn/about-wwi/spotlight-first-usage-poison-gas	No focus in this topic but we are still looking for inspirational scientists	No focus in this topic but we are still looking for inspirational scientists	Link to Percy Julian who discovered plant based medicines, in the context of quality assurance of medicines https://www.biography.com/scientists/percy-julian	By studying nature, Xu and her team have developed a process that actually breaks down biodegradable plastics with just heat and water in a period of weeks. https://www.ecowatch.com/biodegradable-plastic-solution-2652757387.html
Homework/Independent learning	Legacy question to complete. Read about the women mentioned above. During this term students are given legacy questions to help the retrieval of the previous unit of work. This will be 60-minute task every 2 weeks. We called these 'silver' questions In addition, students complete relevant UpLearn topics as part of the retrieval practice.	Legacy question to complete. Read about the women mentioned above. Silver questions UpLearn topic to complete	Legacy question to complete. Read about the women mentioned above. Silver questions UpLearn topic to complete	Legacy question to complete. Read about the women mentioned above. Silver questions UpLearn topic to complete	Legacy question to complete. Read about the women mentioned above. Silver questions UpLearn topic to complete	Legacy question to complete. Read about the women mentioned above. Silver questions UpLearn topic to complete
CIAG coverage/links *Careers in chemistry*	Chemical engineering Senior principal scientist https://edu.rsc.org/job-profiles/senior-principal-scientist/4015672.article	Analytical Chemist https://edu.rsc.org/job-profiles/analytical-chemist/4010854.article	Recycling and chemistry https://edu.rsc.org/job-profiles/research-fellow-battery-recycling/4013825.article	Holly is making a difference by developing new medicines to treat diseases alongside studying towards her degree apprenticeship in chemical science https://edu.rsc.org/job-profiles/associate-scientist-pharmaceuticals/4010913.article	Work in the chemical industry Pharmaceuticals https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article Environmental chemists.

Curriculum Map KS5 Chemistry

Summer Term Year 12	Reactions rates and equilibria	Alcohols	Haloalkanes	Spectroscopy	Organic Synthesis
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Ref 3.2.2. and 2.1.3 This topic investigates the ways in which a change in conditions can affect the rate of a chemical reaction, in terms of activation energy, the Boltzmann distribution and catalysis. Reversible reactions are then studied, including the dynamic nature of chemical equilibrium and the influence of conditions upon the position of equilibrium **The topic includes:** The factors that affect the rate of a reaction How we can measure the rate of a reaction Boltzmann distribution Heterogenous and homogenous catalysts Factors affecting equilibria and Le Chatelier's Principle Writing an expression for Kc Finding Kc given the moles/concentrations at equilibrium Taught by Teacher 2	Ref 4.2.1 This topic investigates alcohols and introduces a new functional group to the students. **The topic includes:** Naming and classifying alcohols. Properties of alcohols Reactions of alcohols including preparation of an aldehyde, ketone and carboxylic acid Dehydration of alcohols Substitution of alcohols Taught by Teacher 1	Ref 4.2.2 This topic introduces another functional group called haloalkanes, and considers the importance of polarity and bond enthalpy to organic reactions. **This topic includes:** Naming haloalkanes Reactivity of haloalkanes including nucleophilic substitution Comparison of the strength of the carbon-halogen bond Organohalogen compounds in the environment (eg CFCs) Taught by Teacher 1	Ref 4.2.3 We now focus on the important techniques of infrared spectroscopy and mass spectrometry and how they are used to illustrate instrumental analysis as a valuable tool for identifying organic compounds. **This topic includes:** Mass spectrometry Infrared spectroscopy Taught by Teacher 2	**Ref 4.2.3** This unit is completed at the end of the as chemistry course and pulls together all the organic techniques covered so far. It also links all the reactions in a synthesis map. **Topics include:** Quick fit apparatus Heating under reflux Distillation Separating and purifying organic liquids Organic synthesis Taught by Teacher 1 and 2
Skills- What will be developed?	Use of Boltzmann distribution model to explain effect on reaction rates. Use of le Chatelier's principle to explain effect of factors on the position of equilibrium. Balancing the effects of equilibrium, rate, safety and economics to determine the conditions used in industrial reactions e.g. Haber process PAG 9.2 The rate of reaction of calcium carbonate and hydrochloric acid	Use of reaction mechanisms to explain organic reactions.	Use of reaction mechanisms to explain organic reactions. Benefits of CFCs; acceptance of scientific evidence explaining ozone depletion leading to government legislation against CFC use. PAG 7.1 Identifying organic unknowns Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab. Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.	Analysis and interpretation of different analytical data. Analysis and interpretation of spectra PAG 5.1: Synthesis of a haloalkane	Opportunities to carry out experimental and investigative work. This includes distillation, finding a melting point and using a separating funnel. Development of synthetic route and a synthesis map.
Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes/concepts will be explored?	What makes a reaction go faster? What is a dynamic equilibrium?	What makes an alcohol different to a hydrocarbon?	What is a CFC?	How does infrared spectroscopy work?	How do I make one organic compound from another? What reagents and conditions do I need?
SEND- how will support be seen? Seating plans? Simplified questions?	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.
Assessment- What? Why? Progress checks are formative and	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment

Curriculum Map KS5 Chemistry

assessments are summative					
What **memory for learning** skills will be required- modelling? Concrete answers? Retrieval?	Linked to GCSE Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	This links with earlier work on hydrogen bonding and demonstrates a concrete example of the effect of hydrogen bonding. Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval. Topic Booklet: Includes Periodic table, topic checklist, revision notes, Oxford exam style questions & a KO
Literacy- reading, extended accurate writing and oracy opportunities	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.
Numeracy/computing skills	Translate information between graphical, numerical and algebraic forms Substitute numerical values into algebraic equations using appropriate units for physical quantities Change the subject of an equation. Identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined	Calculations involving, moles, predicted masses and percentage yields	Calculations involving, moles, predicted masses and percentage yields	Translate information between graphical, numerical and algebraic forms Calculations involving, moles, predicted masses and percentage yields	Calculations involving, moles, predicted masses and percentage yields
Character development	Students will be RESOURCEFUL in applying their numerical skills to a new and more challenging set of equations and synthesising their chemical understanding with the application of numerical skills.	Students will be RESPECTFUL and COMPASSIONATE when discussing alcohols as members of the class may have family members or friends who struggle with alcohol abuse	Students appreciate the ASPIRATIONAL meetings of world leaders in Montreal (1987) who signed the only universal declaration, to prevent damage to the ozone layer by haloalkanes. This has been a successful world intervention which has allowed the ozone layer hole to repair itself.	Rosalind Franklin showed RESILIENCE in continuing her research after being excluded from the acknowledgement of her part in the discovery of DNA's structure (see below for link).	Students appreciate the RESOURCEFUL approach to creating new substances using the whole toolkit of organic reactions. They understand that scientists need to be RESILIENT as chemical mechanisms may need to be revisited when chemical experiments prove that conditions are too difficult to achieve in an economical way.
Equality/Diversity opportunities	Polly Arnold (born 1972) was awarded the Rosalind Franklin Award (2012) and an OBE (2017) for her work in chemistry and for women in STEM. Her work in synthetic chemistry underpins understanding of how catalysts work, especially the use of the lanthanides and actinides	Dangers of alcohol rebranding https://www.bbc.com/worklife/article/20200924-the-feminisation-of-alcohol-marketing Women are affected more badly by alcohol than males	Thomas Midgely, the most harmful inventor, who contracted polio and became paralysed and bedridden. https://www.bbvaopenmind.com/en/science/research/thomas-midgley-harmful-inventor-history/	Rosalind Franklin https://www.youtube.com/watch?v=BIP0lYrdirI	Mary Elliot Hill - Mary was a chemist and a teacher. In fact, she was one of the earliest African American women to become a chemist. Along with her husband, they used to specialise in plastics, using Grignard reagents to form ketones. https://thisisplastics.com/innovation/honoring-black-history-month/
Homework/Independent learning	Legacy question to complete. During this term students are given legacy questions to help the retrieval of the previous unit of work. In addition, students complete relevant UpLearn topics as part of the retrieval practice.	Legacy questions End of topic questions Worksheets UpLearn	Legacy questions End of topic questions Worksheets UpLearn	Legacy questions End of topic questions Worksheets UpLearn	Legacy questions End of topic questions Worksheets UpLearn
CIAG coverage/links *Careers in chemistry*	Chemical engineering https://www.myworldofwork.co.uk/my-career-options/job-profiles/chemical-engineer	Working as a chemist for a brewery might seem like a dream job, and in some ways it is! https://work.chron.com/environmental-careers-biotechnology-15212.html	https://edu.rsc.org/job-profiles/project-leader-in-enhanced-experimentation-oil-and-gas/4010837.article Project leader in advanced experimentation.	Joni investigates biological samples for the presence of drugs and alcohol and also examines evidence seized by the police https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	Research scientist https://edu.rsc.org/job-profiles/senior-principal-scientist/4015672.article

Curriculum Map

Curriculum Map KS5 Chemistry

Autumn Term Year 13	Rates of Reaction	Equilibrium	Acids, Base and pH	Buffers and Neutralisation	Enthalpy and Entropy	Redox and Electrode Potentials	Transition Elements
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Ref 5.1.1 This unit builds on the Year 12 work. Starting with rates of reaction, students will consider the factors affecting the rate. This includes: Orders of reaction from data and graphs Concentration-time graphs Initial rates Rate-determining step Rate constants and temperature including the Arrhenius equation. Taught by teacher 1	Ref 5.1.2 Kc was first introduced in Year 12, students now complete more multi-step calculations and are introduced to Kp The topic include: Kc and homogenous and heterogenous equilibria Finding the concentrations at equilibrium Finding Kp and rearranging Kp Controlling the position of the equilibrium Taught by teacher 2	Ref 5.1.3 Still focussing on equilibrium we now shift are focus on to acids, bases and pH. First introduced in Year 12 and GCSE Topic covered: Bronsted-Lowry acids and bases Conjugate acids and bases The role of H^+ in pH Finding pH of strong acids The dissociation constant Ka Finding the pH of weal acids The ionic product of water Finding pH of a strong base. Taught by teacher 2	Ref 5.1.3 Building on acids and bases students now consider buffers and also their affect on the body. They then investigate neutralisation. Topics include: What is a buffer? How does a buffer work? How do I calculate the pH of a buffer? What is neutralisation and how can this be represented graphically. How do I choose an indicator? Taught by teacher 2	Ref 5.2.1 Having looked at Hess' cycle in Year 12 we now move on to the more complex Born-Haber Cycles. From this we meet entropy and disorder. Topics include: Lattice enthalpy and factors that affect it. Born Haber cycle. Enthalpy changes in solution Factors affect hydration. Entropy Gibbs free energy Taught by teacher 1	Ref 5.2.3 The study of electrode potentials, along with entropy and free energy allows us to predict if a reaction is feasible. We also look at the importance of redox reactions in electrochemical cells. Topics include: Redox reactions including writing and combining half equations. Redox titrations include manganate (VII) and sodium thiosulfate. Electrode potentials include setting up electrochemical cells. Predictions from electrode potentials Storage and fuel cells Taught by teacher 2	Ref 5.3.1 Transition metals looks at the chemical and physical properties of the central section of the periodic table To include: D block elements and transition metals and their properties The formation and shapes of complex ions Stereoisomerism in complex ions Ligand substitutions and precipitation reactions Redox and qualitative analysis. Taught by teacher 1
Skills- What will be developed?	Interpretation if initial rates data to determine orders with respect to reactants. Use of experimental evidence for the proposal of reaction mechanisms. Opportunities to carry out experimental and investigative work. PAG 10.1 Rates – Iodine Clock	Use of le Chatelier's principle to explain effect of factors on the position of equilibrium. Balancing the effects of equilibrium, rate, safety and economics to determine the conditions used in industrial reactions e.g. Haber process	Development of different models over time to explain acid–base behaviour. Using pH as convenient terminology for communicating [H+]. Understanding of the circumstances under which Ka approximations break down. PAG 11.2 pH - titration curves	Opportunities to carry out experimental and investigative work. PAG 11.3 pH – acids and buffers	Application of conservation of energy to determine enthalpy changes. Use the model of entropy to explain thermodynamic stability. Use of entropy, enthalpy and temperature for predicting feasibility. The relative effects of entropy and rate in determining feasibility of processes.	Benefits of electrochemical cells counteracted by risks from toxicity and free from Li-based cells. Set up of electrochemical cells and measurement of voltages. Apply investigative approaches and methods to practical work. PAG 8 – electrochemical cells PAG 12.1 - Investigating iron tablets which involves planning and research skills.	Be able to draw 3-D diagrams to illustrate stereoisomerism. Opportunities to carry out experimental and investigative work.
Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes /concepts will be explored?	Does increasing the concentration always increase the rate? By how much?	What is a dynamic equilibrium? What is Kc and Kp?	What makes a solution acidic? What is pH? How can I calculate pH?	What is a buffer? How do I know which buffer to use?	What is lattice enthalpy and what factors can affect it? What is entropy?	Why are some metals more reactive than others? How do batteries work?	Whay are some compounds different colours? What is special about the metals in the middle of the periodic table?
SEND- how will support be seen? Seating plans? Simplified questions?	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.
Assessment- What? Why? Progress checks are formative and assessments	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment

are summative							
What **memory for learning** skills will be required-modelling? Concrete answers? Retrieval?	Linked to GCSE Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	This links with earlier work on hydrogen bonding and demonstrates a concrete example of the effect of hydrogen bonding. Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.
Literacy-reading, extended accurate writing and oracy opportunities	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report.	Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately. Researching the topic and writing a fully referenced report.	Constructing descriptions using key words. Learning definitions accurately. Writing a scientific report
Numeracy/computing skills	Use calculators to find and use power, exponential and logarithmic functions. Use logarithms in relation to quantities that range over several orders of magnitude. Translate information between graphical, numerical and algebraic forms. Determine the slope and intercept of a linear graph. Calculate rate of change from a graph showing a linear relationship. Draw and use the slope of a tangent to a curve as a measure of rate of change. Use logarithms in relation to quantities that range over several orders of magnitude	Recognise and use expressions in decimal and ordinary form. Use ratios, fractions and percentages. Estimate results. Use calculators to find and use power, exponential and logarithmic functions. Use an appropriate number of significant figures. Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities. Solve algebraic equations.	Use logarithms in relation to quantities that range over several orders of magnitude Recognise and use expressions in decimal and ordinary form. Use ratios, fractions and percentages. Estimate results. Use calculators to find and use power, exponential and logarithmic functions. Use an appropriate number of significant figures. Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities. Solve algebraic equations	Recognise and use expressions in decimal and ordinary form. Use ratios, fractions and percentages. Estimate results. Use calculators to find and use power, exponential and logarithmic functions. Use an appropriate number of significant figures. Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities. Solve algebraic equations Use logarithms in relation to quantities that range over several orders of magnitude	Recognise and use expressions in decimal and ordinary form. Use ratios, fractions and percentages. Estimate results. Use calculators to find and use power, exponential and logarithmic functions. Use an appropriate number of significant figures. Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities.	Recognise and use expressions in decimal and ordinary form. Use ratios, fractions and percentages. Estimate results. Use calculators to find and use power, exponential and logarithmic functions. Use an appropriate number of significant figures. Change the subject of an equation. Substitute numerical values into algebraic equations using appropriate units for physical quantities.	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.
Character development	ASPIRATIONAL and RESOURCEFUL scientists are now looking to expand the use of biological catalysts to reduce energy demands in the attempt to reach Carbon Net Zero.	ASPIRATIONAL work by Le Chatellier.	RESOURCEFUL – see pH below	Lawrence Joseph Henderson contributed to the develop of buffers through the Henderson Hasselbalch equation. He showed COMPASSIONATE understanding of his students, being remembered as having “friendly personal concern [with] generous sharing of fruitful ideas”.	RESILIENT – read Max Born’s story	RESOURCEFUL understanding of the development of fuel cells.	COMPASSIONATE Tenuous link but the colours for chromium ions are purple and green and are the suffragette colours. When I mentioned this in class I was met with blank faces so the suffragette movement was explained briefly.
Equality/Diversity opportunities	We will discuss Arrhenius who received a Nobel prize and we will discuss the majority of white males receiving this prize. https://en.wikipedia.org/wiki/Svante_Arrhenius	I think we need to admire the amazing work by Le Chatelier	https://protomag.com/medical-history/soren-sorensen-pioneer-ph/ Søren Sørenson: The Pioneer of pH	Henderson: http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/henderson-lawrence.pdf	Max Born)Born-Haber cycles) was a Jew in Nazi Germany. https://en.wikipedia.org/wiki/Max_Born Born won the 1954 Nobel Prize in Physics	AKIRA YOSHINO – developed Lithium ion batteries https://www.nobelprize.org/prizes/chemistry/2019/yoshino/facts/	Edith Ellen Humphrey (11 September 1875 – 25 February 1978) was an inorganic chemist. She was probably the first woman from Britain to get a doctorate in chemistry. She worked transition metal complex ions.
Homework/Independent learning	During the physical chemistry units we set a regular homework called Awesome Organic Retrieval.	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework	Awesome Organic Retrieval booklet questions Gold questions Legacy questions for homework

	We also give gold question to go over the previous work from year 12. This continues until Christmas Legacy questions for homework End of unit assessment	End of unit assessment	End of unit assessment	End of unit assessment	End of unit assessment	End of unit assessment	End of unit assessment
CIAG coverage/links *Careers in chemistry*	Patent lawyer https://edu.rsc.org/job-profiles/patent-attorney/4010853.article	Petroleum industry https://www.bp.com/en/global/corporate/careers/students-and-graduates/career-areas-for-graduates/science.html#accordion_Petroleum%20and%20reservoir%20engineering	Dairy Technologist https://www.instituteforapprenticeships.org/apprenticeship-standards/advanced-dairy-technologist-v1-0	Conservation scientist https://www.careerexplorer.com/careers/conservation-scientist/	Science communicator https://edu.rsc.org/job-profiles/science-communicator/4010947.article	Drug discovery https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article	Recycling and chemistry https://edu.rsc.org/job-profiles/research-fellow-battery-recycling/4013825.article

Spring Term Year 13	**Benzene**	**Carbonyl compounds**	**Amines, Amino Acids and Polymers**	**Organic Synthesis**	Chromatography and Spectroscopy
Content- WHAT will be learned? What previous learning can be linked? Why this order/**sequence**?	Aromatic compounds are compounds containing a benzene ring. Many modern-day molecules are aromatic compounds. In this topic we discover aromatic compounds for the first time. **This includes:** The structure of benzene and the different suggested models Naming aromatic compounds Electrophilic substitution reactions of benzene The chemistry of phenol Directing groups in electrophilic substitution reactions	In this unit we learn about the reactions of ketones, aldehydes and carboxylic acids which we previously met in the alcohols unit. We are also introduced to derivatives of carboxylic acids. **This includes:** Naming carbonyl compounds Producing carbonyls from alcohols (linked from Year 12) Identifying carbonyls using chemical tests Carboxylic acids and their reactions Carboxylic acid derivatives and their reactions.	Amines are organic bases derived from ammonia which we have previously met. Amino acids are the building blocks of life and we will investigate their chemical properties. The final section extends our previous knowledge on polymers. **This includes:** What are amines? Classifying and naming amines Amino acids, amides and chirality Condensation polymers	Having met all of the reactions we need we now tie them to together in a synthesis map. How can we make one organic chemical form another. We also look at practical techniques. **This includes:** Carbon-carbon bond formation (extending the carbon chain) this links back to carbonyls. More practical techniques including filtration under reduced pressure, recrystallization and finding the melting point. Further synthetic routes	This unit considers the instrumental methods for analysis. We consider chromatography and NMR and tie the information together with infrared and mass spectrometry that we previously discovered. **This includes:** Chromatography NMR Proton NMR Carbon-13 NMR
Skills- What will be developed?	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing. Practical to distinguish between carbonyls. PAG 7.2 Indentifying organic compounds (plus glucose)	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.

Curriculum Map KS5 Chemistry

Key 'How'/'Why' Questions- What **powerful knowledge** will be gained? What areas/themes/concepts will be explored?	What is benzene? What is special about the bonding?	What is a carbonyl? What are the reactions of carbonyls?	Why do fish smell? What is an amino acid?	How are all the organic molecules connected?	What techniques are used in industry?
SEND- how will support be seen? Seating plans? Simplified questions?	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.	Off colour PowerPoint slides are used Irlens colours are identified. Modelling of answers using the visualiser Scaffolding of answers Model answers given. Demonstration of practical work Glossaries in the end of topic booklets support overlearning of key vocabulary. Long term memory aided by use and access to UpLearn for recall quizzing.
Assessment- What? Why? Progress checks are formative and assessments are summative	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment	Legacy questions for homework End of unit assessment
What **memory for learning** skills will be required- modelling? Concrete answers? Retrieval?	Linked to GCSE Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	This links with earlier work on hydrogen bonding and demonstrates a concrete example of the effect of hydrogen bonding. Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.	Retrieval quizzes throughout starters, model answers within PPTs, progress checks. UpLearn for retrieval.
Literacy- reading, extended accurate writing and oracy opportunities	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.	Using comparative adjectives when describing bonding. Choosing key words to identify structure type. Constructing descriptions using key words. Learning definitions accurately.
Numeracy/computing skills	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.	Understand the symmetry of 2-D and 3-D shapes. Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.
Character development	Kekulé was RESOURCEFUL and RESILIENT as he paid attention to a dream that he had, which enabled him to suggest a structure for Benzene when it had been eluding him.	Mary Elliot Hill - Mary was a chemist and a teacher. In fact, she was one of the earliest African American women to become a chemist, showing ASPIRATION, RESILIENCE and RESOURCEFULNESS (Professor at Kentucky University in 1951)	Daughter of polish immigrants, Kwolek showed RESILIENCE and ASPIRATION as she aimed to engage in a chemistry career.	Asima Chatterjee showed ASPIRATION and RESILIENCE as she created a career in chemistry in a male-dominated society (at that time). She was the first woman to be honoured with vairous University degrees and the first female General President of the Indian Science Congress Association. She fought to get funding, which was difficult as the academic establishments were being founded and new.	ASPIRATION & AMBITION: working in science labs to develop analytical tests for diseases (chromatography was the fundamental principle behind CoVID tests)
Equality/Diversity opportunities	Kathleen Lonsdale confirmed the structure of benzene Kathleen Lonsdale https://www.youtube.com/watch?v=VGJC1LaoD3k&t=3s	https://cen.acs.org/people/profiles/Six-black-chemists-should-know/97/web/2019/02 - ST. ELmo Brady – work on carboxylic acids Mary Elliot Hill - Mary was a chemist and a teacher. In fact, she was one of the earliest African American women to become a chemist. Along with her husband, they used to specialise in plastics, using Grignard reagents to form ketenes. https://thisisplastics.com/innovation/honoring-black-history-month/	**Ryoji Noyori - work on Chirality -** https://www.nobelprize.org/prizes/chemistry/2001/popular-information/ Stephanie Kwolek discovered Kevlar https://en.wikipedia.org/wiki/Stephanie_Kwolek	https://www.youtube.com/watch?v=FmzfaDwYwx4 **Asima Chatterjee** (23 September 1917 – 22 November 2006) was an Indian organic chemist noted for her work in the fields of organic chemistry and phytomedicine.	Sean Collins, working at the University of Leeds, uses a technique known as electron microscopy that allows him to look so closely at materials that it's possible to observe individual atoms and how they form the structure of materials. Sean came out during high school, and has been involved in supporting the LGBT community ever since, committing to making the research and teaching environments he belongs to inclusive ones
Homework/Independent learning	During this half of the year we set a full past paper 1 which is based on the work covered in the Autumn Term. This helps with retrieval.	Legacy Papers UpLearn Full past paper	Legacy Papers UpLearn Full past paper	Legacy Papers UpLearn Full past paper	Legacy Papers UpLearn Full past paper

Curriculum Map KS5 Chemistry

	In addition we also provide legacy questions and topics to complete on UpLearn .				
CIAG coverage/links *Careers in chemistry*	Work in the chemical industry Pharmaceuticals https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	Drug discovery https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article	Product and process development manager https://edu.rsc.org/product-and-process-development-manager/4015740.article	Food Scientist https://globalonline.mmu.ac.uk/news-and-events/how-to-become-a-food-scientist#:~:text='Food%20scientist'%20is%20a%20broad,texture%2C%20nutritional%20value%20and%20safety.	Textile chemist https://www.careermatch.com/job-prep/career-insights/profiles/textile-chemist/

The Summer term half-term of Year 13 focusses on revision and students do past papers, UpLearn and taught revision classes. They sit a mock exam for Paper 2 and Paper 3.