Long Term Plan Year 10 Chemistry

Half Term	Unit Title	Key Knowledge/Content to learn and retain	Essential Skills to acquire (subject & generic)	Link to intent and ethos	Anticipated misconceptions	Links to previous KS	Link to future KS	Opportunity for stretch and high prior attainers	SMSC & British Values	Cultural Capital	Career Link
One	Quantitative Chemistry	Mass, Mr and Moles Concentration of Solution (HT Only) Calculating reaction masses Balancing Equations using moles %Yield and Atom Economy	Changing the subject of an equation Calculating percentage Using ratios Interpreting data presented in both graphical and tabular form. Using laboratory equipment and glassware Recording accurate data Calculating a mean Identifying anomalous and concordant results. Converting units		The difference between g/dm and mol/dm Students often struggle to identify when they need to use molar coefficients in a calculation and when they don't Calculating the Mr of of diatomic molecules, particularly in reaction mass calculations	At KS3 students have studied the mechanics of chemical reactions and have also been introduced to the idea of conservation of mass and balanced equations. Students have also studied neutralisation reactions which builds directly into titration	Quantitative chemistry forms the basis of much of the work done during physical chemistry during A-Level.	Higher prior attainments can be challenged to work through multi-step problems involving different equations	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	As the central science, Chemistry opens doors to a wide range of STEM field careers.
Two	Periodic Table and bonding	The structure of the atom, including the mass and charge of subatomic particles. The history of the atom, including key moments in the development of the nuclear model Isotopes and atomic structure The arrangement of the periodic table, trends in reactivity of groups one, seven and zero. Ionic bonds as the transfer of electrons and covalent bonds as the sharing of electrons Drawing dot and cross diagrams for ionic and covalent bonds The structure and properties of ionic,simple covalent, giant covalent and metallic bonding. Polymers and fullerenes The size and use of nanoparticles	Using data to make predictions. The use of timelines Extended writing Reading for comprehension Using data to make predictions. Interpreting data presented in tabular and graphical form Extended writing (HT Only) Working with standard form		Students often underestimate just how small atoms are, and how much of them is empty space. Students often mix up the names of the scientists responsible for each discovery. Graphite as a special case, in terms of its conductivity. Students often confuse sharing and transferring electrons and this will need to be practiced extensively. The use of the terms "Intermolecular Forces" and "Electrostatic Forces" The true size of nanoparticles	At KS3 students studied the general arrangement of the periodic table and the Dalton model of the atom Students will have previously looked at the common properties of a number of materials, though this will be the first time that students have explored explanations for those properties	Students at A-Level will study periodicity and electronic structure at more detail.	Considering why the results of the Gold Foil Experiment lead to the development of the nuclear model of the atom. Considering why graphite is able to conduct electricity in terms of its bonding. Calculating the size of nanoparticles	The contribution of British scientists to scientific understanding Working safely in the lab, and respecting each other's workspace	The historical importance of the various figures that have contributed to the development of the periodic table and the understanding of the atom. The use of new nanotechnology , and its application in a number of fields.	As the central science, Chemistry opens doors to a wide number of STEM field careers.
Three	Energy Changes	Endothermic and Exothermic Reactions Reaction pathways Bond Energy and bond energy calculations (Triple Only) Fuel cells	Interpreting data presented in both graphical and tabular form. Using laboratory equipment and glassware Recording accurate data Calculating a mean Changing the subject of an equation Using data to evaluate and compare		Mislabelling of the activation energy and overall energy change on reaction profile diagrams. Students often miscalculate bond energies by doing products - reactants rather than reactants - products	This unit builds directly from the energetics unit, studied in year 8; extending students prior knowledge of endothermic and exothermic reactions to explore why this is the case.	Students at A-Level will study energetics in more detail, looking calorimetry, Hess' Law and more complex enthalpy calculations	Students may be challenged to find a missing bond enthalpy if given the overall energy change for a reaction	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	As the central science, Chemistry opens doors to a wide range of STEM field careers.
Four	Rate and Extent of Chemical Change	Measuring and calculating the rate of a chemical reaction The effect of temperature, pressure, concentration, surface area and presence of a catalyst on	Interpreting data presented in both graphical and tabular form. Using laboratory equipment and glassware Recording accurate data Calculating a		Students often struggle to link dynamic equilibria with changing environmental conditions. Students often do not talk about collisions when explaining the	Students have previously studied the basic concept of "rate of reaction" and how a catalyst affects this.	At A-Level students will study kinetics in more detail, looking at rate constants and rate equations	Higher prior students can be challenged to suggest compromise conditions for industrial process that utilize reversible equations given the	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios	As the central science, Chemistry opens doors to a wide range of STEM field careers.

		the rate of reaction Reversible Reactions and dynamic equilibria, including making predictions about changing yield when environmental conditions	mean Changing the subject of an equation Using data to evaluate and compare Drawing tangents to a graph		effect of various factors on the rate of reaction			enthalpy change and balanced equation for the reaction			
Five	Chemical Analysis	Pure and impure substances Chromatograph Gas Testing (Triple Only) Flame testing, ion testing and spectroscopy	Gas Testing (Triple Only) Flame testing, ion testing and spectroscopy Following written methods and flow charts Interpreting chromatograms and other experimental results Writing scientific methods Measuring and recording accurate results Safe use of laboratory equipment and glassware Presenting and interpreting data in both tabular and graphical form.		Students often confuse the results of the various ion tests. Students often describe spectroscopy as being more “accurate” or “Reliable” as opposed to more “Sensitive” or “Precise”	Students have studied the idea of pure and impure substances, mixtures vs compounds and separation techniques at KS3.This unit extends this by introducing deeper analysis - not just separating mixtures but identifying their components.	Organic Analysis is studied in further depth at A-Level, where students will look at more complex spectroscopic methods, such as IR and MS spectroscopy.	Students could be presented with complex mixtures or a number of different solutions and challenged to produce viable methods of identification.	Safe working in the lab, and respect for others workspaces.	The use of spectroscopic methods in real life applications, such as quality assurance and forensic investigation	As the central science, Chemistry opens doors to a range of STEM Field careers
Six	Revision and Examinations	Half term six is dedicated to preparation for the summer PPEs, followed by targeted intervention, review, reflection and improvement work; which will be planned bespoke to each class depending on the data collected.									