Curriculum Map: Year 11 Subject: GCSE Chemistry (Separate science) Exam Board: AQA

Topic	Key Knowledge *What will all students KNOW by the end of the topic?*	Key Skills *What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?*	Assessment Opportunities *What are the key pieces of assessment? How will students be assessed?*
Recap Quantitative and continue on topic	- Consolidation of writing and balancing equations - Be familiar with specific key terms e.g. relative atomic mass/formula mass, mole, limiting reactant - Recap the conservation of mass law - Avogadro's number - Amounts of substance can be measured in moles - How conservation of mass can be understood using formula masses and moles in balanced equations - How to calculate % of an element in a compound - How to calculate reacting masses in balanced equations What limiting reactants are and their effect on reacting mass calculations - Percentage yield and atom economy - How concentration of solutions is measured in chemistry - What a titration is and how to carry one out - The relationship between moles, concentration and volume and the link between this and moles, mass and Mr - Be familiar with specific key terms e.g. relative atomic mass/formula mass, mole, limiting reactant, yield, concentration -The uncertainty associated with any measurements taken - Equal moles of gases occupy the same volume (at RTP) - The volume of 1 mole of any gas is 24dm3 -Revision of paper 1 content from Year 10	-Investigating mass changes using various apparatus -Writing, balancing and interpreting chemical equations Use formula mass to calculate moles and vice versa Recognising and use expressions in standard form Using ratios, fractions and percentages -Changing the subject of a variety of equations Converting units -Using appropriate numbers of significant figures -Writing, balancing and interpreting chemical equations -Using formula mass to calculate moles and vice versa -Recognising and use expressions in standard form Using ratios, fractions and percentages -Changing the subject of a variety of equations Converting units -Using appropriate numbers of significant figures -Identifying anomalous results and making estimations of uncertainty -Calculating the mean of a data set and use the range as a measure of uncertainty -Describing how to carry out titrations using strong acids and strong alkalis -Calculating the chemical quantities in titrations in both mol dm^{-3} and g dm^{-3} -Competent use of technical laboratory equipment (pipette, pipette filler and burette)	-Starter tasks to review prior learning -Ongoing PPQ -Calculations consistently during lessons (including focus on standard form, ratios, significant figures etc.) -Topic test

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		-Calculating the volumes of gaseous reactants and products from balanced equations	
Energy changes	- Energy is conserved during chemical reactions - What exothermic and endothermic reactions are including everyday examples of them - How reaction profiles are used to represent chemical reactions - What activation energy is - Energy is needed to break chemical bonds - Energy is released when new bonds are formed - Chemical cells and fuel cells - Alkaline cells and batteries - Rechargeable cells and batteries - Fuel cells and the overall reaction within them	-Writing, balancing and interpreting chemical equations -Measuring temperature changes of simple chemical reactions and classifying them as exo or endothermic -Investigating the variables that affect temperature changes -Drawing and interpreting reaction profiles for exothermic and endothermic reactions -Calculating energy changes in reactions using supplied data -Writing, balancing and interpreting chemical equations -Applying the reactivity of metals to displacement reactions -Elucidation of chemical formulae -Writing and balancing general and ionic equations -Writing and balancing ionic half equations -Identifying species that have been oxidised or reduced -Predicting products from given reactants -Interpreting data relating to relative reactivity of metals used in cells -Evaluating the use of hydrogen fuel cells compared to other cells and batteries	Required practical 4- variables that affect temperature change ion reactions PPQ Starters to consolidate prior knowledge -Topic test
Rate and extent of chemical change inc. Haber process and NPK fertilisers from	- What rate of reaction is and the different ways that it can be monitored, measured and calculated - The factors that affect the rate of chemical reactions - How changing these factors affects the rate of chemical reactions - Collision theory - Activation energy	-Writing, balancing and interpreting chemical equations -Drawing and interpreting graphs from given or experimental data -Calculating the mean rate of reaction -Drawing tangents to curves	-Required practical- Rates -Starter tasks interleaving past knowledge -PPQ -AfL throughout lessons -Topic test

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using resources topic	- What catalysts are and how they affect the rate of reactions and reaction profiles - That some reactions are reversible and examples of reversible reactions - Energy changes in reversible reactions - The concept of chemical equilibrium - Le-Chatelier's principle - The effect of changing conditions on equilibrium - Th effect of changing concentration on equilibrium - The effect of changing temperature on equilibrium - The effect of changing pressure on equilibrium - The Haber process - The production and uses of NPK fertilisers	-Measuring the gradient of tangents -Using a wide range of laboratory equipment to investigate rates of reaction: loss of mass, the gas syringe, inverted measuring cylinder, colour change. -Selecting appropriate techniques for monitoring the rate of a reaction -Investigating how changing concentration affects the rate of reaction -Predicting and explaining the effect on the rate of reaction when changing variables -Comparing data and results quantitatively -Explaining catalytic activity in terms of activation energy -Investigate catalytic effects in reactions -Comparing data and results quantitatively -Identifying reversible reactions -Making qualitative predictions about changes made to systems at equilibrium -Interpreting graphs of reaction conditions versus rate -Applying principles of dynamic equilibrium to the Haber process including the trade-off between rate of production and position of equilibrium -Comparing the industrial production and laboratory preparation of compounds that can be used as fertilisers the production and use of NPK fertilisers	
Organic chemistry	- The origin and composition of crude oil - The Alkanes are a homologous series - The general formula and structure of the alkanes - How fractional distillation is used to refine crude oil - Uses of the fractions from crude oil - Properties of hydrocarbons: boiling points, viscosity and flammability - The processes of thermal and steam cracking - Products of cracking including alkenes	-Use Molymod kits to build and interpret models of organic molecules -Making predictions of properties based upon regularly changing patterns -Explaining the process of fractional distillation -Using molecular models to represent alkanes, alkenes and overall chemical reactions	-Accurate use of Molymods -Ability to name organic compounds competently -Homeworks -Starter tasks -Regular PPQ practice -Topic test

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	- Chemical reactions of alkenes - Usefulness of cracking in terms of supply and demand of molecules in crude oil - The unsaturated nature of alkenes and the chemical test for alkenes - Structures and names of alcohols and carboxylic acids - Uses of alcohols - Chemical reactions of alcohols - Production of alcohols via fermentation - The functional groups for a range of organic molecules - Chemical reactions of carboxylic acids - The process and chemical notation for addition polymers - The process and chemical notation for condensation polymerisation - The role of amino acids in the production of naturally occurring and synthetic condensation polymers	-Evaluating the process of cracking in terms of sustainability -Building and interpreting models of organic molecules -Making predictions of properties based upon regularly changing patterns -Using molecular models to represent alkanes, alkenes, alcohols, carboxylic acids, esters, addition polymers and condensation polymers as well as overall chemical reactions -Describing the reactions of and interpreting formulaic reactions of alkenes, alcohols, carboxylic acids and amino acids -Recognising addition and condensation polymers from their monomers, repeating units and polymer structures -The basic principles of addition and condensation polymerisation	
Chemical analysis	-The difference between pure substances and mixtures and formulations -Physical separation processes including: Filtration, crystallisation, simple and fractional distillation and chromatography T-he gases: • Hydrogen • Oxygen • Carbon dioxide and • Chlorine can be identified by simple laboratory tests and the positive test results for these gases	-Fluency in the use of IUPAC nomenclature regarding representations of apparatus -Construction and use of word and symbol equations. -Be able to explain how chromatography separates mixtures. -Interpretation of chromatograms -Describing how to carry out tests for gases -Application of key mathematical skills: Calculating Rf values or distances moved by a solvent or a substance during chromatography. -Practical skills and development and apparatus use: Setting up running paper chromatography (Req Prac 6).	-Required practical 6 and 7- chromatography (6) and test for ions (7) -PPQ -Homework

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	-The metal ions: • Lithium, Sodium, Potassium, Calcium and Copper can be identified using flame tests and the positive tests and problems associated with these tests -The use of sodium hydroxide to test for as well as the absence of, metal ions -The carbonate ions test -The halide ions test -The sulfate ions test -How instrumental methods including flame emission spectroscopy are used to identify metal ions in solution	-Representations of more complex chemistry apparatus. -Describing how to carry out flame tests -Describing how to carry out tests for anions and cations -Practical skills and development and apparatus use: Using chemical tests to identify the ions in unknown ionic compounds (Req Prac 7)	
Review summer work from chemistry of the atmosphere	-The proportions of the different gases in the atmosphere -The theory of how the Earth's early atmosphere was generated, how it has changed and what has and is currently changing it. Specifically: • Combustion reactions • Carbon dioxide production • Other pollutants -Principles behind the greenhouse effect -How human activities contribute towards the greenhouse effect -Principles behind and effects of climate change -The definition of a carbon footprint, how it's value is arrived at and how it can be reduced -A range of common atmospheric pollutants, their sources and effects	-Fluency in the use of IUPAC nomenclature regarding construction and use of word and symbol equations. -Explaining how (new) evidence can lead to changes in and/or re- enforcement of, accepted models. -Be able to evaluate the quality of evidence -Be able to describe uncertainties in evidence -Be able to describe how a range of pollutants are formed and predict the products of combustion reactions -Be able to describe and explain the problems caused by increased levels of pollutants -Be able to describe effects of global climate change -Be able to discuss the scale, risk and environmental implications of climate change -Be able to describe actions to reduce greenhouse gas emission but also why these may be limited	-AfL throughout lessons -PPQ -Interleave with Biology Ecology topic
Homework booklet: Using resources	- A range of renewable and finite resources and their origins. - What sustainable development is - How water treated and is made potable	-Recalling key terminology. -Explaining how agriculture has an impact on the use of resources	Required practical – water Homework booklet with practice questions to assess

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	- How ceramics, polymers and composites are made as well as their properties - Ways of reducing the use of resources - What a Life Cycle Assessment is - How recycling, re-using and reducing can all have an impact on sustainability	-Explaining how water (from a range of sources) is treated and made potable -Using simple laboratory equipment to make pure water by distillation. -Carry out and interpret chemical tests to the water before and after -Explaining how polymers are produced and the different properties of polymers -Qualitative comparisons of glass, ceramics, polymers, composites and metals -Applying understanding of sustainable development to a range of familiar and unfamiliar examples -How to carry out a simple Life Cycle Assessment Processing data from a wide range of sources relating to a wide range of products, services and processes	Starter tasks interleaving past knowledge PPQ AfL throughout lessons