

Chemistry Curriculum Map – Key Stage 4

Year 10

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>SC8 Acids and Alkalis - Paper 1</p> <p>In this unit we explore the nature of acidic and alkaline solutions, and investigate their most important reactions properties and uses.</p>	<p>SC9 Calculations involving Masses - Paper 1 and 2</p> <p>This unit will help you to use relative atomic masses to calculate relative formula masses of elements and compounds, calculate the concentration of a solution and work out empirical and molecular formulae of compounds.</p>	<p>SC10-13 Electrolytic Processes / Metals / Reversible Reactions and Equilibria - Paper 1</p> <p>This unit will help you learn more about reactivity, oxidation and reduction, the advantages of recycling, about the Haber process and what happens during electrolysis.</p>	<p>SC14-16: Quantitative analysis/ dynamic equilibria, calculations involving volumes of gases/ chemical and fuel cells</p> <p>This unit will help you to learn more about reaction pathways. SC15 covers fertiliser and the Haber process, and factors affecting equilibrium. SC16 looks at chemical cells and fuel cells.</p>	<p>Summer PPE Exams and revision</p>	<p>SC17-19 Groups in the Periodic Table. Rates of Reaction. Heat Energy Changes in Chemical Reactions.</p> <p>This unit introduces you to alkalis, halogens, displacement reactions and noble gases, rates of reaction and catalysts, exothermic and endothermic reactions and energy changes in reactions.</p>
<p>Assessment:</p> <ul style="list-style-type: none"> • End of topic test • Six mark question 	<p>Assessment</p> <ul style="list-style-type: none"> • End of topic test • Six mark question 	<p>Assessment:</p> <ul style="list-style-type: none"> • End of topic test • Six mark question 	<p>Assessment:</p> <ul style="list-style-type: none"> • End of topic test • Six mark question 	<p>Assessment:</p> <p>PPE's</p>	<p>Assessment:</p> <ul style="list-style-type: none"> • End of topic test • Six mark question
<p>Builds upon:</p> <p>From KS3:</p> <ul style="list-style-type: none"> • Solubility, solutes, solvents and solutions 	<p>Builds upon:</p> <p>From KS3:</p> <ul style="list-style-type: none"> • How to represent elements and 	<p>Builds upon:</p> <p>From KS3:</p>	<p>Builds upon:</p> <ul style="list-style-type: none"> • Conservation of mass 		<p>Build upon:</p> <ul style="list-style-type: none"> • Periodic table including groups and periods

<ul style="list-style-type: none"> • Common international hazard symbols • The use of indicators to test the pH of solutions • What happens during simple neutralisation reactions <p>From KS4 SC5-7</p> <ul style="list-style-type: none"> • Ionic and covalent bonding and properties • Ionic formula 	<p>compounds using symbols</p> <ul style="list-style-type: none"> • How mass is conserved during changes of state and chemical reactions • How to show chemical reactions using equations <p>From KS4 SC3-4 and SC8:</p> <ul style="list-style-type: none"> • Balancing equations • Using the periodic table • Relative atomic mass 	<ul style="list-style-type: none"> • Oxidation and displacement reactions • The reactivity series <p>From KS4 SC4, SC5 and SC8:</p> <ul style="list-style-type: none"> • Anions and cations in ionic compounds • Writing balanced chemical equations with state symbols • How the elements are arranged in the periodic table 	<ul style="list-style-type: none"> • Reacting masses calculation • Concentration calculations • Moles calculations • Dynamic equilibria • Mr calculations • Acids base reactions • Electrolysis • Redox and half equations 		<ul style="list-style-type: none"> • Electronic configuration • Elements & compounds • Reactivity of metals with water & acid • Properties of metals word and symbol equations • Observations • Redox (for higher only) • Particle model • Enzyme activity relating to rates of reactions in biology
<p>Introduces:</p> <ul style="list-style-type: none"> • The ions in acids and alkalis and how their concentrations are linked to pH • The reactions between acids and different types of bases • Different indicators that can be used in titrations • How soluble and insoluble salts can be prepared in the laboratory 	<p>Introduces:</p> <ul style="list-style-type: none"> • How to calculate relative formula masses of elements and compounds • How to work out empirical and molecular formulae of compounds • How to calculate the mass of reactants or products in a reaction • How to calculate the concentration of a solution 	<p>Introduces:</p> <ul style="list-style-type: none"> • More about reactivity, oxidation and reduction • How metals can be extracted • The advantages of recycling metals • The factors involved in a life-cycle assessment of a product 	<p>Introduces:</p> <ul style="list-style-type: none"> • Yield calculations including reason why yield is lower than actual • Atom economy calculations • Concentration calculations in mol/dm³ and g/dm³ • Making a standard solution method 		<p>Introduces:</p> <ul style="list-style-type: none"> • Describe and explain reactivity of group 1 metals • Reactions of group 1 with oxygen and water • Physical trends of group 7 • Describe and explain reactivity of group 7 • Halogens are diatomic molecules • Test for Cl₂ gas • Reactions of group 1 with group 7 including predictions based on position in periodic table

<ul style="list-style-type: none"> Balancing chemical equations 	<ul style="list-style-type: none"> The Avogadro constant (H) 	<ul style="list-style-type: none"> What happens during electrolysis and electroplating Equilibria in chemical reactions The Haber process Half equations (H) Properties of transition metals Properties and uses of metals and their alloys 	<ul style="list-style-type: none"> Titration calculations and recap method Molar volume of a gas calculations including Avogadro gas law Fertilisers and the Haber process including the specific conditions required and considering compromise Comparing lab and industry production of chemicals Factors affecting position of equilibrium including rate Chemical cells: Why do batteries go flat fuels cells pros and cons need to be able to compare the different types of cells High equations (higher only) 		<ul style="list-style-type: none"> Reactions of halogens with hydrogen Observations from group 7 displacement reactions with explanations Devise an experiment to prove reactivity from displacement reactions Higher only – understand halogen displacement reactions are redox reactions and explain why Explain reactivity of noble gases, uses and trends in physical properties Describe and explain how reaction rates change over time Calculate rates of reactions (see below) Describe ways in which to investigate rates of reactions e.g. volume of gas formed, forming precipitate, colour change and mass change Describe and explain factors that affect rates of reaction using collision theory Draw and interpret rate graphs Describe what a catalyst is and how it works Draw a reaction profile for a reaction with and without a catalyst, highlighting the activation energy
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					<ul style="list-style-type: none">• Describe endothermic and exothermic reactions and give examples• Draw simple reaction profiles of endothermic and exothermic reactions• Describe a method to determine if a reaction is endothermic or exothermic• Knowing that breaking bonds is endothermic and making bonds is exothermic (BENDOMEXO)• bond energy calculations from values provide
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Year 11

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>SC 20-21 Fuels, Earth and atmospheric science</p> <p>SC20 covers hydrocarbons, fractional distillation of crude oil, the alkane homologous series, complete and incomplete combustion, fuel and pollution. SC21 looks at the earth's atmosphere.</p>	<p>PPE's SC22-24 Hydrocarbons, Alcohols & carboxylic acid, Polymers</p> <p>This unit covers alkanes and alkenes and will look at ethanol production and carboxylic acids.</p>	<p>SC25-26 Qualitative analysis: test for ions, Bulk and surface properties of matter including nanoparticles</p> <p>In this unit, you will learn:</p> <ul style="list-style-type: none"> • How to identify metal ions • the chemical tests for various non-metal ions and for ammonia gas • about instrumental methods of analysis and their advantages • how to compare the physical properties of different materials • what composite materials are • how and why materials are chosen for particular uses • about nanoparticles and their properties, 	<p>PPE's</p>	<p>revision</p>	

		uses and possible risks			
Assessment: <ul style="list-style-type: none"> • End of topic test • Six mark question 	Assessment <ul style="list-style-type: none"> • PPE's 	Assessment: <ul style="list-style-type: none"> • End of topic test • Six mark question 	Assessment: PPE's <ul style="list-style-type: none"> • 		
Builds upon: <ul style="list-style-type: none"> • Use of fractional distillation • Fuels as a source of energy • Acidity of non-metal oxides • Impact of CO₂ on the atmosphere and human impacts • Bonding of carbon atoms 	Builds upon: <ul style="list-style-type: none"> • Combustion of fuels • Properties of polymers • Definition of homologous series 	Builds upon: <ul style="list-style-type: none"> • Cations and anions including polyatomic ions • Test for CO₂ • Properties of ceramics, polymers, metals and composite materials 			
Introduces: <ul style="list-style-type: none"> • Definition of crude oil and natural gas and their use as fuels • That the • Above are non-renewable fossil fuels • Definition of a hydrocarbon as a 	Introduces: <ul style="list-style-type: none"> • Alkanes are saturated hydrocarbons • Alkanes: general, structural and molecular formula • Alkenes are unsaturated hydrocarbons 	Introduces: <ul style="list-style-type: none"> • Method of how to carry out flame tests and explain each step • Positive flame test results for metal cations 			

<p>compound of hydrogen and carbon ONLY (this is a 2 mark answer)</p> <ul style="list-style-type: none"> Name the different fractions of crude oil and their uses Describe and explain how a fractionation column separates the fractions of crude oil Describe and explain the trends in physical properties of the different fractions of crude oil. Understand what is meant by homologous series in terms of alkanes Be able to name and draw the first few alkanes (including molecular and display formula) Recall the general formula for alkanes (see below) Describe and explain the trend in physical properties of the alkanes Describe and explain the similar chemical properties of alkanes 	<ul style="list-style-type: none"> Alkenes: general, structural and molecular formula Description and examples of structural formulas, how to draw isomers of compounds Identify and state numbers of different types of bonds in alkanes and alkenes Combustion of alkanes and alkenes in terms of oxidation Use of bromine water as a test to distinguish between alkanes and alkenes. Addition reactions of alkenes How to produce ethanol through fermentation. Word and balanced equation for production of ethanol. Formula & names of alcohols Alcohols as renewable fuels Equations for oxidation of alcohols to carboxylic acids + water 	<ul style="list-style-type: none"> Theory of flame photometry as a improved instrumental method Method for precipitation method with sodium hydroxide to identify metal cations and ammonium ion including precipitate colour for positive results Test for ammonia using litmus paper and HCl Test for carbonates using HCl to produce CO₂ Test for sulphates using HCl and barium sulphate Test for halide ions using silver nitrate and colours for positive results Balanced and word equations for the above reactions 			
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<ul style="list-style-type: none"> • Word and balanced equations for both complete and incomplete combustion • Tests for the products of complete combustion • The issues with the products of incomplete combustion • How sulphur dioxide is formed from impurities in fuels and its environmental effects • How oxides of nitrogen are formed from combustion and their environmental effects • Use of catalytic converters to reduce pollutant emission from combustion engines. • Understand the supply and demand of hydrocarbons • Describe and explain cracking and its importance • Alternative fuels for cars such as Hydrogen including advantages and disadvantages • Describe the early atmosphere in terms of 	<ul style="list-style-type: none"> • Functional group of carboxylic acids and naming • General & structural formula of carboxylic acids • Equations for reaction between metals/ metal compounds and carboxylic acids • Addition polymerisation, covalent bonds between carbon atoms in monomers • Be able to draw polymers from monomers & identify repeat units of a polymer using structural formula (including polyesters – see below) • Naming and roles/ properties of synthetic and naturally occurring polymers • Process of condensation polymerisation between an alcohol and carboxylic acid to form esters + water • Identify ester functional group and ester linkages in polyesters 	<ul style="list-style-type: none"> • Ionic equations for reactions (higher only) • Observations including precipitates and colours • Know what ceramics are, their properties and uses. • Uses of different plastics (though this has been covered in previous topic) • Explain what a composite material is, give examples and list properties. • Be able to calculate the size (surface area and volume) of a nanoparticle • Uses of nanoparticles in e.g. sunscreen and silver for antibacterial purposes and any 			
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<p>gases present and where they came from</p> <ul style="list-style-type: none"> • Describe how the oceans formed from the earth cooling. • Name different greenhouse gases. • Evidence for the increase in oxygen in the early atmosphere • Describe the modern atmosphere and reasons for the change in atmospheric gas composition. • Describe the greenhouse effect including being able to draw/ interpret the diagram • Test for oxygen using a smouldering splint • Evaluate the evidence for climate change including ice core samples and sea level rise data. • Understand the effect of climate change and how these can be limited. 	<ul style="list-style-type: none"> • Properties of synthetic polyesters • Identify advantages and disadvantages of synthetic polymers • Identify methods for disposing & recycling plastics including related issues • Difference between recycling and reusing • 	<p>potential drawbacks.</p> <ul style="list-style-type: none"> • 			
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