

Year 10 Chemistry	1	2	3	4	5	6	Rotation
Topic Title	C3.1 Introducing Chemical Reactions	C3.2 Energetics	C3.3 Types of Chemical Reactions	C3.4 Electrolysis	C5.2 Controlling Reactions		C4.1 Predicting Chemical Reaction
Rationale	Fundamental skills (formulae, equation writing and balancing) that will be required for forthcoming topics areas in Year 10 - chemical reactions and analysis.	Having just completed how to write and use formulae and given the pupils will focus on chemical reactions in subsequent. They must have prior knowledge of writing and using equations as well as how chemical reactions have heat changes and can be wholly classified accordingly as exothermic or endothermic.	Pupils have been learning the foundations of equation writing and key terminology. They can identify heat changes and characteristics of changes such that they can now apply, analyze, explain and evaluate specific chemical reactions	Pupils have now learnt about half equations and how to write them. They have knowledge of both metallic and non metallic ions and that charge can be carried by conductors	The students can study how fast reactions occur and how far they go to completion. They need to have prior knowledge and been taught particle model, types of reactions (Exo/Endo) and energetics in reactions, both are taught in Year 9 and 10 respectively.		Having studied the periodic table in Year 9, a more comprehensive study is to be made of Groups 1,7 and 0. This builds on previous module on chemical reactions and working with equations
Prior knowledge	Types of formula. Relative formula mass and using the periodic table	K33-Exothermic and endothermic reactions. KS4 writing chemical formulae and equations.	K33- acids and alkalis, pH, chemicals that are acidic or alkaline, particle model. KS4 - ions, writing and balancing chemical and ionic equations	K33 - charge movement in physics due to electrons and chemistry ions. Knowledge of diffusion of particles in systems. Introduction to the reactivity series of metals. Year 10- Writing half equations	Year 10-Energetics in reactions and types of reactions. Year 9 and K33 - The particle model and states of matter.		K33 study of the same groups which is expanded upon in terms of reactivity and key reactions and properties.
Key knowledge/skills development	Writing chemical formulae of ionic compounds, using equations, writing balanced symbol equations, molar calculations	Identify and compare exothermic and endothermic reactions. Draw reactions profiles for these reactions and identify activation energy. Calculate energy changes in chemical reactions using bond energy values	What is the meaning of oxidation and reduction. Writing half equations. Define an acid, base and alkali. Recognise the particles responsible for acidity and alkalinity. Describe what happened during neutralisation and how to prepare a salt. To learn about reactions of acids, the difference between strong and weak acids and use the terms dilute and concentrated correctly.	Describe the term electrolysis. Predict products of electrolysis of molten compounds and ionic solutions. Describe how electrolysis can be used to purify copper and in the process of electroplating of metals.	Explain what is meant by rate of reaction and how to perform practical methods for its measurement. Describe and explain the effect of temperature, concentration or pressure, surface and a catalyst on rate of reaction. Graph plotting and analysis, development of planning, analysis and evaluative techniques, numerical skills.		Recall physical and chemical properties of the Group 1, Group 7 and Group 0. Predict properties from reactivity trends. Explain the reactivity of Group 1 and Group 7. Describe and explain displacement reactions. Explain the lack of reactivity down Group 0. Recall the general properties of the transition metals. Describe Laboratory skills to detect hydrogen, oxygen, carbon dioxide and chlorine.
National Curriculum/specification links	C3.1a-i	C3.2a-d	C3.3a-k	C3.4a-e	C5.2a-i		C4.1a-c, C4.2 a,b
Literacy			Journalist article about Svante Arrhenius and hydrogen ions or how the pH Scale was derived <a href="https://www.nobelprize.org/prizes/chemistry/1903/arrhenius/biographical/">https://www.nobelprize.org/prizes/chemistry/1903/arrhenius/biographical/</a>	Hydrogen Fuel Cells: Research and create a booklet on the merits of hydrogen as a power source	Chemistry in a cage - article - literacy questions <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/01a%20and%20products%20from%20a%20ICHEMISTRY%20in%20a%20cage.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/01a%20and%20products%20from%20a%20ICHEMISTRY%20in%20a%20cage.pdf</a>		Halides in photography - research and produce newspaper article
Numeracy	Working out formulae and relative formula mass - molar calculation work	Bond energy calculations	Calculating concentrations and using equations	Reacting Mass calculations	Measuring volumes and calculating rates of reaction - graphical analysis		Reacting Mass calculations
STEM	Ionic Sudoku (Stem Sharepoint - KS4 Chemistry)  Problem solving Collaboration Analytical	Design a pocket warmer (Stem Sharepoint - KS4 Chemistry) <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Energetics/Designing%20a%20pocket%20warmer.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Energetics/Designing%20a%20pocket%20warmer.pdf</a>  Creativity Problem Solving Communication Collaboration Quantitative	Neutralisation and indigestion tablets: <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Acids%20and%20bases/Neutralisation%20of%20indigestion%20tablets.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Acids%20and%20bases/Neutralisation%20of%20indigestion%20tablets.pdf</a>  Problem Solving Communication Collaboration Quantitative Analytical	The migration of ions. <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Electrolysis/02a%20and%20ions.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Electrolysis/02a%20and%20ions.pdf</a>  Electrochemica; writing equipment <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Electrolysis/02a%20and%20ions.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Electrolysis/02a%20and%20ions.pdf</a>  Problem Solving Communication Collaboration Creativity Rationalise	Investigating the chemicals in rhubarb <a href="https://edu.rsc.org/experiments/rate-of-reaction-of-potassium-manganate(vii)-and-oxalic-acid/745.article">https://edu.rsc.org/experiments/rate-of-reaction-of-potassium-manganate(vii)-and-oxalic-acid/745.article</a>  analyse plan implement rationalise		Silver halides: <a href="https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Energetics/Burning%20and%20bonding%20experiment.pdf">https://helthorpe.sharepoint.com/sites/STEMLearning/Shared%20Documents/STEM%20Resources/ScienceKS4/Chemistry/Energetics/Burning%20and%20bonding%20experiment.pdf</a>  Investigate for a photographic company the effect of light on halides <a href="https://edu.rsc.org/experiments/making-a-photographic-print-using-silver-chloride/454.article">https://edu.rsc.org/experiments/making-a-photographic-print-using-silver-chloride/454.article</a>  Problem Solving Analytical Collaboration Communication
Cross curricular links	Mathematical skills, use of formulae and problem solving (Yr 7 - T1, T6, Y18 - T1, T4, T6, Y9 - T1, T2, T4, Y10 - T2, T4)	Mathematical skills, use of formulae and problem solving (Yr 7 - T1, T6, Y18 - T1, T4, T6, Y9 - T1, T2, T4, Y10 - T2, T4)	Technology / Cookery - acidity in foods. (Year 7 T2,3,4 (Year 8 T1,2,3)	Design and Technology - electroplating Physics - electric circuits (Year 8 and Year 10)	Mathematical skills, use of formulae and problem solving, graph plotting (Yr 7 - T1, T6, Y18 - T1, T4, T6, Y9 - T1, T2, T4, Y10 - T2, T4)		Design and technology - uses of metals - Year 10
Key vocabulary	Mole, molar mass, half equation, ionic equation, conservation of mass, molecular formula, ionic formula, compound ions	Exothermic, endothermic, reaction profile, activation energy, bond energy	Redox oxidation, reduction, acid, alkali, pH, neutralisation, titration, weak acid, strong acid, dilute, concentrated	Electrolysis, ions, electrolyte, cathode, anode, electrode, discharge reactivity series, electroplating	Rate of reaction, collision, inversely proportional, pressure, temperature, catalyst, surface area, activation energy.		Alkali metals, noble gases, halogens, trend, reactivity, displacement, halide ion, inert, monatomic, transition metals, catalysis.
Catch up / Plan / Closing the gaps			What are the Key skills/concepts/knowledge that each child should have learned (not covered) since march? Practicals resumed and PAGES missed to be completed and reviewed once course content complete How are you identifying gaps in your subject? Retrieval starters, SENECA, Assessment AP1; Y10 assessment based on last years work.  Catch up methods, Homework – based on content missed, Review type questioning starters, Questions-in-a-month, Going for Gold, 6 mark Q sheets, PLC Booklets review, SENECA  Revision materials: Talking ppt, Get-its and Know-its ppt, "Summary" A3 broadsheet learning mats  How are you and your team capturing evidence so that you as HOF can be confident we are aware of all pupils gaps? Faculty Tracker (detailed), SENECA – topic specific assessments, Q&A sessions, Starters, HW				

Year 11 Chemistry							7	8
Term	1	2	3	4	5	6	7	8
Topic Title	C5.2 Controlling Reactions & C5.3 Equilibria (Term 1 - Combined Science)	C6.2 Organic Chemistry (Term 2 - Combined Science)	C5.1 Monitoring chemical reactions (Triple only)		Revision and PAGES		C6.1 Improving Processes and Products	C6.3 Interpreting and interacting with Earth Systems
Rationale	These two topics fit together well. The students can study how fast reactions occur and how far they go to completion. They need to have prior knowledge and been taught particle model, types of reactions (Exo/Endo) and energetics in reactions, both are taught in Year 9 and 10 respectively.	Pupils must have covered electrolysis and have a sound understanding of equations and drawing chemical structures. They are recycling key reactions such as combustion and polymerisation already.	This topic uses calculation techniques previously studied in Year 9/10 collectively - Higher Tier content which has a more advanced or extended calculation content.		Final preparation for examinations (Completion of rotation material where necessary) - revision lessons, practice papers and review of all PAG practicals - Pupils can use this time to do practicals missed during the lockdown periods. COVID CATCHUP PLAN FOR PAGES		Pupils have now learnt about half equations and how to write them. They have knowledge of both metals and non metallic ions and that charge can be carried by conductors	This topic is covered in conjunction with renewable/non-renewable forms of energies and fuels in physics in Year 11. Link between Science curricula. Students also cover climate change in have knowledge of both metals and coccicula links at the same stage of development. The students have also covered all major pollutant gases in other topic areas and this can be studied in conjunction with the organic chemistry topic.
Prior knowledge	Year 10 Energetics in reactions and types of reactions. Year 9 and KS3 The particle model and states of matter.	KS4 - electrolysis, writing chemical equations, types of formula, structure of materials - bulk properties of polymers and ceramics	Molar calculations - Year 10, percentage calculations (Maths - KS3). Writing and using chemical equations Y10. Acids/bases - Y10.		This is a review of all content covered at KS4		KS3 - Extracting metals and Reactions of metals. KS4 - equilibrium reactions, electrolysis.	KS3 - the pupils cover climate change and water extensively in Geography in Year 8/9 and at the beginning of Year 11 which allows cross curricula links at similar stage of development
Key knowledge/skills development	Explain what is meant by rate of reaction and how to perform practical methods for its measurement. Describe and explain the effect of temperature, concentration on pressure, surface area and a catalyst on rate of reaction. Describe what a reversible reaction is and provide some examples. Describe the term dynamic equilibrium and make predictions of changing reaction conditions of the equilibrium position. Graph plotting and analysis, development of planning, analysis and evaluative techniques, numeracy skills.	Explain the term homologous series and draw structures and predict alkane, alkenes, alcohols, carboxylic acid reactions. Describe and explain the separation of crude oil by fractional distillation. Explain why crude oil is a finite resource. Describe the cracking of crude oil into fractions. Describe the principles of addition polymerisation, work out the structures of polymers and monomers. Describe DNA and other naturally occurring polymers in terms of their monomers. Explain the principles of condensation polymerisation and how they are synthesised. Evaluate the advantages and disadvantages of fuel cells and how they work. Drawing organic molecules, using a general formulae, chemical formulae, 6 marker practice.	Key terminology understanding and use. Methodology in calculations. Writing chemical equations. Working Scientifically / Experimental skills - titration technique, molar volume of gases.		Review of all key content, exam practice and technique, practise of analytical skills. Review of key terminology and their use.		Describe the importance of NPK fertilisers and how they are made. Describe and explain the conditions used in the Haber and Contact Process. Explain the processes used to extract metals with reference to copper, iron and aluminium. Evaluate bioleaching and Phytoremediation as methods of extraction. Describe the properties of alloys and how they relate to their uses. Describe the properties required for corrosion and how it is minimised. Compare the physical properties of ceramics, polymers and metals. Explain how the uses of materials are related to their properties. Describe the basic principles of a life cycle assessment and evaluate data. Describe how materials are recycled and evaluate the decisions made in recycling.	Explain how the atmosphere formed and became oxygen rich. Describe the major sources of pollutants in the atmosphere and the problems these cause. Describe the atmospheric greenhouse effect and how problems can be reduced and evaluate the causes. Describe how wastewater, groundwater and salt water is made safe to drink. Describe and explain skills, opinion related and evaluative tasks.
National Curriculum/specification links	C5.2a-i, C5.3a-c.	C6.2a-q	C5.1a-k		NA		C6.1a-r	C6.3a-g
Literacy	Chemistry in a cage - article - literacy questions <a href="https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/09a%20Qm%20pnp/vct%20from%20a%20Chemistry%20n%20a%20cage.pdf">https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/09a%20Qm%20pnp/vct%20from%20a%20Chemistry%20n%20a%20cage.pdf</a>	Nitroium - article - design questions on sections	Create an instruction leaflet about how to conduct a titration			Phytoremediation mining <a href="https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Reactivity%20Series%20Redox%20Reactions%20and%20Extraction%20of%20metals/Phytoremediation%20and%20mining.pdf">https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Reactivity%20Series%20Redox%20Reactions%20and%20Extraction%20of%20metals/Phytoremediation%20and%20mining.pdf</a>	Pupils to research and develop a booklet on the effect of atmospheric pollutants	
Numeracy	Measuring volume and calculating rates of reaction - graphical analysis	Organic sudoku <a href="https://edu.rsc.org/resources/28-chemistry-nurture/aw/14/16/awen028/article">https://edu.rsc.org/resources/28-chemistry-nurture/aw/14/16/awen028/article</a>	Calculating Yields, Titrations, Gas calculations			Calculating yields from extractions	Analysis of climate data	
STEM	Investigating the chemicals in fizzy drinks <a href="https://edu.rsc.org/experiments/rate-of-reaction-of-potassium-manganate(vi)-and-oxalic-acid/745/article">https://edu.rsc.org/experiments/rate-of-reaction-of-potassium-manganate(vi)-and-oxalic-acid/745/article</a>	Problem Solving Communication Collaboration Creativity Critical Thinking Reflectivity Analytical Rationalise	Finding the formula of hydrated copper sulphate rock - geologists need to analyse the rock and check for its composition of water <a href="https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Formulae%20Reactions%20Masses%20Yields%20and%20Atom%20Economy%20and%20the%20formula%20of%20hydrated%20copper%20sulphate.pdf">https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Formulae%20Reactions%20Masses%20Yields%20and%20Atom%20Economy%20and%20the%20formula%20of%20hydrated%20copper%20sulphate.pdf</a>			Problem Solving Communication Collaboration Quantitative Analytical Rationalise	Greenhouse effect: what is it? Students produce the greenhouse gas CO <sub>2</sub> through a simple chemical reaction, measure the effect of the gas on air temperature and relate their conclusions to the greenhouse effect in our atmosphere. <a href="https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Greenhouse%20Effect/The%20greenhouse%20effect%20and%20the%20atmosphere.pdf">https://nelthorpe.sharepoint.com/sites/STEM/Learning/Shared%20Documents/STEM%20Resources/Science/KS4/Chemistry/Greenhouse%20Effect/The%20greenhouse%20effect%20and%20the%20atmosphere.pdf</a>	
Cross curricular links	Mathematical skills, use of formulae and problem solving, graph plotting (Y7 - T1, T6, Y8 - T1, T4, T6, Y9 - T1, T2, T4, Y10 - T2, T4)	Engineering (Year 10 T1-4), Geography - environmental effects of crude oil extraction Geography - climate change, Y9 T4, Y11 T1,3; Atmosphere Y8 T3,4	Mathematical skills, use of formulae and problem solving (Y7 - T1, T6, Y8 - T1, T4, T6, Y9 - T1, T2, T4, Y10 - T2, T4)		NA	History - Extraction of chemicals (Y8 T2, Y10 T4, Haber process - Y9 T1,2 Geography - rocks and ores, Technology Y8 T4	Geography - climate change, Y9 T4, Y11 T1,2; Atmosphere Y8 T3,4	
Key vocabulary	Rate of reaction, collision, inversely proportional, pressure, temperature, catalyst, surface area, activation energy.	Alkane, alkene, fractional distillation, cracking, combustion, addition.	Theoretical yield, limiting reactant, actual yield, percentage yield, atom economy, reaction pathway, titration, burette, and point, molar volume, mole.		NA	Fertilisers, Haber Process, batch and continuous process, non-renewable, hydration, ore, redox reaction, blast furnace, slag, coke, electrolysis, cathode, anode, bioleaching, phytoremediation, carbon neutral, corrosion, alloy, galvanising, composite, life cycle assessment	Climate change, pollutants, atmosphere, photosynthesis, particulates, anthropogenic, global warming, carbon capture, potable water, desalination	
Catch up Plan / Closing the gaps	What are the key skills/concepts/knowledge that each child should have learned (not covered) since March? Chem: C3 Types of chemical reactions Practical resumed and PAGES missed to be completed and reviewed once course content complete  How are you identifying gaps in your subject? Y10 assessment based on last year's work. Retrieval starters, SENEA, AP1 and Mock exams  Catch up methods, Homework - based on content missed, Review type questioning starters, Questions in a month, Going for Gold, 6 mark Q sheets, PLC Booklets review, SENEA							