Science Year Long Term Map Chemistry y10

Subject Intent/Aims

Expose all students to a broad range of learning opportunities to deepen their knowledge and understanding of themselves and the world around them and to build a solid foundation of Science knowledge and skills. We believe in developing curiosity and understand that science is an active process with many questions to be answered and still to be asked. We provide an understanding of how knowledge was derived, discovered and came to be accepted by the scientific community. By focusing on thinking, interpreting and evaluating rather than simply memorising scientific fact we intend to enable our students to use the skills that they need to answer their own scientific questions.

Our focus on the scientific process as a way of thinking and working will allow our students to develop their own ideas, attitudes and interpretations.

Topic CHEMICAL CHANGE	Topic ENERGY CHANGES IN CHEMICAL REACTIONS	Topic QUANTITATIVE CHEMISTRY	Topic CH	
National Curriculum: Chemical changes • determination of empirical formulae from the ratio of atoms of different kinds • balanced chemical equations, ionic equations and state symbols • identification of common gases • the chemistry of acids; reactions with some metals and carbonates • pH as a measure of hydrogen ion concentration and its numerical scale • electrolysis of molten ionic liquids and aqueous ionic solutions • reduction and oxidation in terms of loss or gain of oxygen • extraction and purification of metals related to the position of carbon in a reactivity series. GCSE Chemistry Specification Specification for first teaching in 2016 (aqa.org.uk)	National Curriculum: Energy changes in chemistry • Measurement of energy changes in chemical reactions (qualitative) • Bond breaking, bond making, activation energy and reaction profiles (qualitative). GCSE Chemistry Specification Specification for first teaching in 2016 (aga.org.uk)	National Curriculum: • quantitative interpretation of balanced equations • concentrations of solutions in relation to mass of solute and volume of solvent GCSE Chemistry Specification Specification for first teaching in 2016 (aqa.org.uk)	Nation Rate and extent of ch influence the rate of concentration, chang reactant or by adding reversible reactions. <u>GCSE Chemistry Specifi</u> in 2016 (aqa.org.uk)	
Composition	Composition	Composition	Composition	
Apply knowledge of Chemical Changes to explain how they are vital in the extraction of metals and producing salts.	understand how interactions of particles involves Energy Changes	understand Quantitative chemistry by determining the formulas for compounds and using equations for reactions.	Describe the factors apply understanding	
Components	Components	Components	Components	





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c RATE AND EXTENT OF HEMICAL REACTIONS

nal Curriculum:

hemical change • factors that f reaction: varying temperature or ging the surface area of a solid g a catalyst • factors affecting

fication Specification for first teaching

affecting rate of reaction and g to measure rate of reaction





Component 1: Know oxidation and reduction in terms of loss or gain of oxygen or electrons. Component 2: Know a reactivity series of metals based on experimental results Component 3: Know products formed when molten or dissolved binary compounds are electrolysed Component 4: Know how to make soluble salts Component 5: Know the main hazards in practical contexts; plan experiments to test hypotheses; carry out experiments appropriately; describe techniques; make and record observations; present data appropriately Component 6: Know that acids produce H+ ions and can be strong or weak determined by the degree of ionisation Component 7: Know the products of acid and base reactions	Component 1: Know exothermic and endothermic changes, Component 2: use reaction profiles to describe them, Component 3: calculate theoretical energy transfers using bond energies and investigate the variables that affect the temperature changes in solutions. Component 4: Know independent, dependent and control variables; identify the main hazards in practical contexts; plan experiments to test hypotheses; carry out experiments appropriately; describe techniques; read measurements from scales; make and record observations; present data appropriately	Component 1: Know common symbols and equations. Component 2: Know relative formula masses and moles. Component 3: Know how to use moles to calculate reacting masses and to balance equations, and how to calculate theoretical and percentage yields. Component 4: Know how concentration is expressed and use this in simple titrations. Component 5: Know how to calculate gas volumes Component 5: Know how to calculate gas volumes	Component 1: Kno up reactions and u activation energy t Component 2:Know to predict the effect pressure and conce whilst exploring re Component 3: Kno hazards in an invest Component 4: Kno investigations to te Component 5: Kno patterns and trend Component 6: Kno make predictions a reasoned conclusio
Composites Describe oxidation and reduction in terms of oxygen and electrons Predict the products of electrolysis of binary compounds Explain the stages in a method to make a soluble salt Predict the products given a set of reactants Determine the pH of solutions Classify solutions as strong or weak	Classify reactions as endothermic or exothermic based on experimental data Reproduce energy profiles with correct labels Determine the type of reaction by calculating bond energies	Convert units from g-kg etc Calculate RFM given a periodic table and chemical formula Use equations to calculate moles and masses Calculate theoretical and percentage yields given relevant data Analyse titration data to calculate the concentration of a solution	predict the effects and concentration exploring reversibl use collision theo energy to make p recognise and deso use models and da communicate findi
Higher Order Knowledge	Higher Order Knowledge	Higher Order Knowledge	Higher Order Know
Know the reactivity series is linked to the tendency of metals to form positive ions and the extraction method used to extract each metal. Predict products and write equations for the reactions at each electrode. Know and distinguish between strong acids and concentrated acids, and explain what happens during neutralisation.	Know and investigate voltaic cells and fuel cells and evaluate their usefulness as sources of energy. Know patterns and trends; use models in explanations; use data to make predictions; and communicate findings and reasoned conclusions.	Apply multiple step calculations to solve complex problems Know a titration can be used to determine unknown concentrations	Know how to calcu curve on these gra at a specific time. Know the relative an at equilibrium deper system is at equilibri conditions, then the





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bw how to identify ways of speeding use collision theory and ideas about to make predictions.

w how to use Le Chatelier's principle ects of changing temperature, centration on equilibrium systems eversible reactions.

ow how to identify variables and stigation.

bw how to plan and carry out est different hypotheses.

ow how to recognise and describe ds in data

ow how to use models and data to and communicate findings and ons

s of changing temperature, pressure on equilibrium systems whilst le reactions

ory and ideas about activation predictions

cribe patterns and trends in data

ata to make predictions and lings and reasoned conclusions

wledge

ulate the gradient of a tangent to the apply as a measure of rate of reaction

mounts of all the reactants and products nd on the conditions of the reaction. If a ium and a change is made to any of the e system responds to counteract the





			change. The effects c equilibrium can be p
Key terms	<u>Key terms</u>	Key terms	Key terms
Reactivity Series of Metals	Exothermic Reaction	Relative Atomic Mass (RAM), Ar Relative Formula Mass, Mr	Activation Energy
Oxidation	Endothermic Reaction	Mole	Enzymes
Reduction	Activation Energy	Avogadro Constant Conservation of Mass	Closed System
Displacement Reaction	Reaction Profile	Thermal Decomposition	Dynamic Equilibriu
Redox Reaction	Bond Energy	Limiting Reactant	le Chatelier's Princ
Ore	Covalent Bond	Yield Percentage Vield	
Electrolysis	Mole	Atom Economy	lurbidity
Electrolyte	Cell	(Atom Utilisation) Pinette	Catalyst
Discharge	Battery	Burette	
Anode	Electrolyte	End Point Concordant	
Cathode	Fuel Cell		
Inert Electrodes	Anode		
	Cathode		
Final Composition/Deliberate Practice	Final Composition/Deliberate Practice	Final Composition/Deliberate Practice	Final Composition
Required practical to make a soluble salt	Required practical investigating the effect of variables on the energy change in a reaction	Use a titration to determine a concentration of a known solution	Required practicals measuring loss of rea
Summative/Formative assessment	Summative/Formative assessment	Summative/Formative assessment	Summative/Form
Core questions RRR to recall prior knowledge will be tested at the beginning of each lesson and self- assessed by the student. Century nuggets and PPQs LC for oxidation and reduction LC for electrolysis End of unit assessment will be marked with personalised feedback	Core questions RRR to recall prior knowledge will be tested at the beginning of each lesson and self- assessed by the student. Century nuggets and PPQs LC for energy changes End of unit assessment will be marked with personalised feedback	Core questions RRR to recall prior knowledge will be tested at the beginning of each lesson and self- assessed by the student. Century nuggets and PPQs LC for a range of calculations End of unit assessment will be marked with personalised feedback	Core questions R tested at the beg assessed by the s Century nuggets LC for rates of re End of unit asses personalised fee End of year(mod from y9 and 10





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of changing conditions on a system at predicted using Le Chatelier's Principle.

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ciple

/Deliberate Practice

to determine rate of reaction eactant or product

native assessment

RRR to recall prior knowledge will be ginning of each lesson and selfstudent. s and PPQs eactions ssment will be marked with

- edback
- ckexam) to cover all topics covered





Numeracy	Literacy	Numeracy	Literacy	Numeracy	Literacy		Numeracy	Literacy
Maths skills – graphs, calculations	English – literacy skills – focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms,	Maths skills – graphs, calculations	English – literacy skills – focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms,	Maths skills – graphs, calculations	English – literacy s focusing on keywo tier 3 vocabulary, connectives, SPAG synonyms,	skills – ords, 5,	Maths skills – graphs, calculations	English – literacy skills – focusing on keywords, tier 3 vocabulary, connectives, SPAG, synonyms,
Cross curricular links Cross curricular link		Cross curricular links	Cross curricular links			Cross curricular links		
History: development of electricity PE use of icepacks Geography: extraction of resources from the Earth Engineering- use of a		PE use of icepacks Engineering- use of alte	rnative fuel cells	Food prep: reacting proportions		History- Fritz Haber and use of gases in concentration camps. Biology- Use of enzymes in reactions. Food technology- Use of enzymes in food production and washing powder.		
SMSC Brit		British	h Value		RSHE	RSHE		
There will be multiple opportunities for students develop spiritually; being creative in their learning and a range of activities The high expectations placed on the student from the school and department mean that pupils will regularly be made aware of the right and wrong morally Pupils are expected to share the views morally on the different topics but also show respect and appreciate others in the classroom. The majority of topics will give the students opportunity to develop their social skills, from giving presentations to working in group tasks.		Students will be taught the legal implications of using the internet Students will be taught to fully appreciate other students viewpoints and the importance of being respectful Students will be taught the importance of selecting valid information from reliable sources Students are taught how to contribute to life in modern Britain by learning about the history of scientific discovery Students will learn how to display British Values to use the internet		the The ma m reliable The issu ng about the The	The students will be taught about how to be safe online and the dangers. The students will be made aware of online relationships and the sexual issues that may arise. The students will be regularly conversed on their physical and mental health when issues arise within topics They will be taught about the need for tolerance of other people's viewpoints			

Adapted Curriculum Content:	Adapted Curriculum Content:	Adapted Curriculum content:	<u>Ad</u>
Half equations triple and higher only Link between dilution and pH higher only	Bond energy calculations limited to higher and triple. Batteries and Fuel cells triple only	Titration method and calculations triple only Atom economy and limiting reactant higher and triple only The Mole concept higher only	Finer point Using tang





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dapted curriculum content:

ts of the Haber process higher only Le Chatelier higher only ngents to calculate rate higher only





Adaptive Implementation Practices:	Adaptive Implementation Practices:	Adaptive Implementation Practices:	Adap
Coloured paper/pens	Coloured paper/pens	Coloured paper/pens	Coloured pa
Differentiated worksheets	Differentiated worksheets	Differentiated worksheets	Differentiate
Differentiated tasks	Differentiated tasks	Differentiated tasks	Differentiate
Seating plans to maximise concentration allowing for	Seating plans to maximise concentration allowing for	Seating plans to maximise concentration	Seating plan
visual/hearing impairments etc	visual/hearing impairments etc	allowing for visual/hearing impairments etc	for visual/he
Appropriate use of IWB	Appropriate use of IWB	Appropriate use of IWB	Appropriate
Dual coding	Dual coding	Dual coding	Dual coding
Spare equipment	Spare equipment	Spare equipment	Spare equipr
Modelling experimental detail	Modelling experimental detail	Modelling experimental detail	Modelling ex
Pre drawn tables/graphs/diagrams to be labelled	Pre drawn tables/graphs/diagrams to be labelled	Pre drawn tables/graphs/diagrams to be	Pre drawn ta
Scaffolding for longer answer questions.	Scaffolding for longer answer questions.	labelled	Scaffolding f
		Scaffolding for longer answer questions.	_





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ptive Implementation Practices:

aper/pens

- ted worksheets
- ted tasks
- ins to maximise concentration allowing
- nearing impairments etc
- e use of IWB

pment

- experimental detail
- tables/graphs/diagrams to be labelled
- for longer answer questions.









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