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 RATE AND EXTENT OF CHEMICAL REACTIONS
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 (aqa.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)	**National Curriculum:** Rate and extent of chemical change • factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst • factors affecting reversible reactions. GCSE Chemistry Specification Specification for first teaching 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 affecting rate of reaction and apply understanding to measure rate of reaction
Components	**Components**	**Components**	**Components**

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 1: Know how to identify ways of speeding up reactions and use collision theory and ideas about activation energy to make predictions. Component 2:Know how to use Le Chatelier's principle to predict the effects of changing temperature, pressure and concentration on equilibrium systems whilst exploring reversible reactions . Component 3: Know how to identify variables and hazards in an investigation. Component 4: Know how to plan and carry out investigations to test different hypotheses. Component 5: Know how to recognise and describe patterns and trends in data Component 6: Know how to use models and data to make predictions and communicate findings and reasoned conclusions
Composites	**Composites**	**Composites**	**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 of changing temperature, pressure and concentration on equilibrium systems whilst exploring reversible reactions use collision theory and ideas about activation energy to make predictions recognise and describe patterns and trends in data use models and data to make predictions and communicate findings and reasoned conclusions
Higher Order Knowledge	**Higher Order Knowledge**	**Higher Order Knowledge**	**Higher Order Knowledge**
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 calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time. Know the relative amounts of all the reactants and products at equilibrium depend on the conditions of the reaction. If a system is at equilibrium and a change is made to any of the conditions, then the system responds to counteract the

			change. The effects of changing conditions on a system at equilibrium can be predicted using Le Chatelier's Principle.
Key terms	**Key terms**	**Key terms**	**Key terms**
Reactivity Series of Metals Oxidation Reduction Displacement Reaction Redox Reaction Ore Electrolysis Electrolyte Discharge Anode Cathode Inert Electrodes	Exothermic Reaction Endothermic Reaction Activation Energy Reaction Profile Bond Energy Covalent Bond Mole Cell Battery Electrolyte Fuel Cell Anode Cathode	Relative Atomic Mass (RAM), Ar Relative Formula Mass, Mr Mole Avogadro Constant Conservation of Mass Thermal Decomposition Excess Limiting Reactant Yield Percentage Yield Atom Economy (Atom Utilisation) Pipette Burette End Point Concordant	Activation Energy Enzymes Closed System Dynamic Equilibrium Le Chatelier's Principle Turbidity Catalyst
Final Composition/Deliberate Practice	**Final Composition/Deliberate Practice**	**Final Composition/Deliberate Practice**	**Final Composition/Deliberate Practice**
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 to determine rate of reaction measuring loss of reactant or product**
Summative/Formative assessment	**Summative/Formative assessment**	**Summative/Formative assessment**	**Summative/Formative assessment**
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 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 rates of reactions End of unit assessment will be marked with personalised feedback End of year(mockexam) to cover all topics covered from y9 and 10**

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 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,
Cross curricular links		**Cross curricular links**		**Cross curricular links**		**Cross curricular links**	
History: development of electricity Geography: extraction of resources from the Earth		PE use of icepacks Engineering- use of alternative 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	British Value	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 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:**	**Adapted curriculum content:**
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 points of the Haber process higher only Le Chatelier higher only Using tangents to calculate rate higher only

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