



Aspire & Challenge

Year 10 Chemistry Curriculum Overview

Topic	Timing	Key knowledge and skills	Progression and links	SEND/ More able	Assessment & recording; factual recall checks
Chemical Changes	Autumn Term	<p>Students should:</p> <ul style="list-style-type: none"> Describe oxidation and reduction in terms of gain or loss of oxygen. Write word equations for the metals listed in the reactivity series reacting with oxygen, water, and acid and balance given symbol equations. Predict observations for the metals listed in the reactivity series reacting with oxygen, water, and acid. Explain why a displacement reaction occurs. Write word equations and straightforward balanced symbol equations for displacement reactions. Predict observations for the metals listed in the reactivity series reacting with a different metal salt. Identify species that are being oxidised and reduced in a chemical reaction. Explain why some metals are found un-combined in the Earth's crust. Describe how to make a salt by reacting a metal with an acid. Write a balanced symbol equation to describe a reaction between a metal and sulfuric acid or hydrochloric acid. Identify the formula of the salt produced from the reaction between an acid and a metal. Describe a method to prepare a pure, dry sample of a soluble salt from an insoluble substance and a dilute acid. Write a balanced symbol equation to describe a reaction between a metal hydroxide or oxide and sulfuric acid or hydrochloric acid. Explain why the reaction between a base and a dilute acid is a neutralisation reaction. Describe how to make a dry sample of a salt from reacting a metal carbonate or an alkali with a dilute acid. Write balanced symbol equations for neutralisation reactions. Describe how universal indicator can be used to classify a chemical as acidic or alkaline. 	<p>Numeracy</p> <ul style="list-style-type: none"> Standard Form <p>Literacy</p> <ul style="list-style-type: none"> Use of tier three words Extended writing opportunities 	<p>Challenge:</p> <ul style="list-style-type: none"> Explaining why certain products are formed in the electrolysis of solutions . Higher level questions – strong and weak acids. Conversion between units and/or standard form <p>Scaffold:</p> <ul style="list-style-type: none"> Pre prepared results tables Knowledge organisers Scaffold for extended writing 	<ul style="list-style-type: none"> 5 questions to start – recall activity every lesson. Close the gap questions Self and peer feedback on tasks completed Structure strip Past paper exam Qs. Summative assessment at the end of the unit

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Chemical Changes	Autumn Term	<p>Students should:</p> <ul style="list-style-type: none"> Describe the relationship between alkalis and bases. Recall examples of strong and weak acids. Describe how an acid or alkal be concentrated or dilute. Describe how an acid or alkal be weak or strong. Describe electrolysis in terms of movement of ions. Write a balanced symbol equation including state symbols for the overall electrolysis of a molten ionic compound. Predict the products at each electrode for the electrolysis of a molten ionic compound. Describe electrolysis of solutions in terms of movement of ions. Write a balanced symbol equation including state symbols for the overall electrolysis of a solution. Predict the products at each electrode for the electrolysis of a molten ionic compound or its solution. Describe the electrolysis of aluminium oxide. Explain why electrolysis is an expensive metal extraction method and illustrate this with the extraction of aluminium. Explain why cryolite is added to aluminium oxide in the industrial extraction of aluminium. Describe how to electrolyse brine in terms of ions moving. Predict the products of electrolysis of a solution. Plan and carry out an electrolysis investigation. 			

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Energy Changes	Spring Term, Half-term one	<p>Students should:</p> <ul style="list-style-type: none"> Describe examples of exothermic and endothermic reactions. Explain, using observations from calorimetry, how to classify a reaction as exothermic or endothermic. Explain in detail how to carry out a calorimetry experiment. Explain how an energy change from a chemical reaction can be used. Write balanced symbol equations for familiar reactions. Label activation energy on a reaction profile diagram. Generate a specific reaction profile diagram for a given chemical reaction when its energy change is also supplied. Identify bonds broken in reactants and new bonds made in products of a reaction. Explain, using the particle model, how reactants become products in a chemical reaction. Explain why bond breaking is endothermic and bond making is exothermic. Define bond energy and identify all the bonds that break and are made in a chemical reaction. Explain how potential difference can be changed in a cell. Interpret data from an electrochemical cell to determine the reactivity of the metals involved. Explain why non-rechargeable batteries stop working. Explain how a hydrogen fuel cell produces electricity. List the advantages and disadvantages of hydrogen fuel cells. Explain why hydrogen fuel cells are an alternative to rechargeable cells and batteries. 	<p>Numeracy</p> <ul style="list-style-type: none"> Bond energy calculations <p>Literacy</p> <ul style="list-style-type: none"> Use of tier three words Extended writing opportunities 	<p>Challenge:</p> <ul style="list-style-type: none"> Evaluate the use of fuel cells as an alternative to battery powered vehicles <p>Scaffold:</p> <ul style="list-style-type: none"> Pre prepared results tables Knowledge organisers Scaffold for extended writing 	<ul style="list-style-type: none"> 5 questions to start – recall activity every lesson. Close the gap questions Self and peer feedback on tasks completed Structure strip Past paper exam Qs. Summative assessment at the end of the unit

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Quantitative Chemistry	Spring Term	<p>Students should:</p> <ul style="list-style-type: none"> • Use the periodic table to find the relative atomic mass of all elements. • Calculate the relative formula mass for unfamiliar compounds when the formula is given. • State the units for the amount of substance. • Explain why chemical equations must be balanced. • Calculate the relative formula mass for one substance when the relative formula masses are given for all the other substances in a balanced symbol equation. • Explain why chemical equations must be balanced. • Identify the limiting reactant in a chemical reaction. • Calculate percentage yield when the actual yield is given and the mass of the limiting reactant is given. • List reasons why actual yield is often lower than theoretical yield. • Calculate the atom economy for a given chemical reaction. • Explain why using reactions with high atom economy is important. • Explain how concentration of a solution can be changed. • Calculate the concentration, in mol/dm³, of a solution when the number of moles and volume in dm³ is given. • Calculate the concentration of a solution in g/dm³ of a solution when the number of moles and volume in dm³ is given. • Calculate a titre. • Describe how an indicator can be used to determine the end point. • Explain how accuracy can be improved in a titration. • Calculate the amount of acid or alkali needed in a neutralisation reaction. • Convert units. • Calculate the amount in moles of gas in a given volume at room temperature and pressure. • Convert units. 	<p>Numeracy</p> <ul style="list-style-type: none"> • Rearranging equations • Standard form • Ratios <p>Literacy</p> <ul style="list-style-type: none"> • Use of tier three words • Extended writing opportunities <p>CEIAG</p> <p>Gatsby 4 - Science and careers</p> <p>Production Chemists (IT opportunity)</p>	<p>Challenge:</p> <ul style="list-style-type: none"> • Applying a range of mathematical skills. • Higher level questions – Required Practical - titration. • Conversion between units and/or standard form <p>Scaffold:</p> <ul style="list-style-type: none"> • Pre prepared results tables • Knowledge organisers • Scaffold for extended writing 	<ul style="list-style-type: none"> • 5 questions to start – recall activity every lesson. • Close the gap questions • Self and peer feedback on tasks completed • Structure strip • Past paper exam Qs. • Summative assessment at the end of the unit

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Rate and Extent of Chemical Change	Summer Term	<p>Students should:</p> <ul style="list-style-type: none"> Explain how there can be different units for measuring rate of reaction. Calculate the mean rate of reaction. Calculate the rate of reaction at a specific time. Describe how changing the surface area changes the rate of reaction. Describe what the activation energy of a reaction is. Calculate the surface area to volume ratio. Use collision theory to explain how changing temperature alters the rate of reaction. Calculate mean rates of reaction. Use collision theory to explain how changing concentration or pressure alters the rate of reaction. Calculate mean rates of reaction. Explain how to change gas pressure. Use collision theory to explain how adding a catalyst alters the rate of reaction. Explain, with an example, the industrial use of a catalyst. Calculate the mean rate of reaction. Explain, using a familiar reaction, how a reaction can be reversible. Describe a familiar reversible reaction using a balanced symbol equation. Predict the observations of a familiar reversible reaction when the conditions are changed. Explain why the energy change in a reversible reaction is exothermic in one Direction and endothermic in the reverse direction. 	<p>Numeracy</p> <ul style="list-style-type: none"> Calculating rates Drawing graphs Drawing tangents and calculating rates from a gradient. <p>Literacy</p> <ul style="list-style-type: none"> Use of tier three words Extended writing opportunities 	<p>Challenge:</p> <ul style="list-style-type: none"> Applying a range of mathematical skills. Higher level questions – Required Practical – rate of reaction. Factors affecting dynamic equilibrium <p>Scaffold:</p> <ul style="list-style-type: none"> Pre prepared results tables Knowledge organisers Scaffold for extended writing 	<ul style="list-style-type: none"> 5 questions to start – recall activity every lesson. Close the gap questions Self and peer feedback on tasks completed Structure strip Past paper exam Qs. Summative assessment at the end of the unit

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Rate and Extent of Chemical Change	Summer Term	<p>Students should:</p> <ul style="list-style-type: none"> • Generate balanced symbol equations for reversible reactions from information provided. • Make predictive observations of familiar reversible reactions when information is supplied. • Describe how to achieve dynamic equilibrium. • Describe how the rate of the forward reaction compares to the rate of the backward reaction in dynamic equilibrium. • Describe Le Chatelier's Principle. • Explain how changing conditions for a system at dynamic equilibrium affects the rate of the forward and reverse reactions. • Predict the effect on yield of changing temperature, concentration, or pressure in a given equilibrium system. 			