Curriculum Rationale and Overview

Subject: Chemistry **Year group: 10**

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
National Curriculum context	A simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes The number of particles in a given mass of a substance The modern Periodic Table, showing elements arranged in order of atomic number Position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons Properties and trends in properties of elements in the same group Characteristic properties of metals and non-metals Chemical reactivity of elements in relation to their position in the Periodic Table	Determination of empirical formulae from the ratio of atoms of different kinds Reduction and oxidation in terms of loss or gain of oxygen. Balanced chemical equations, ionic equations and state symbols	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	Quantitative interpretation of balanced equations Concentrations of solutions in relation to mass of solute and volume of solvent	Measurement of energy changes in chemical reactions (qualitative) Bond breaking, bond making, activation energy and reaction profiles (qualitative)	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 Distinguishing between pure and impure substances Separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation
Scheme of Learning Title:	Atomic Structure and the Periodic Table	Chemical Changes	Chemical Changes continued…	Quantitative Chemistry	Energy Changes	Rate and Extent of Chemical Change and Chemical Analysis

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Content *What will students know?*	everything is made of atoms Difference between elements, compounds and mixtures The structure of atoms The relative charges of subatomic particles The difference between elements and their isotopes. How Mendeleev's work shaped the modern periodic table.	Describe how metals react with oxygen and state the compound they form, define oxidation and reduction	The difference between molten and aqueous solutions How oxidation and reduction can be defined in terms of electrons What pH measures and practical ways of measuring this. HIGHER: the difference between concentration and strength of solutions	The law of conservation of mass Where to find the relative atomic mass of elements on the periodic table. There is uncertainty every time a measurement is made. HT: The number of particles in 1 mole of substance = Avogadro's constant TRIPLE: the amount of reactant ending up as useful product is described as atom economy TRIPLE: one mole of any gas at room temperature takes up 24dm^3 of volume.	Reactions can be described as endothermic and exothermic. Exothermic reactions release energy to the surroundings, endothermic reactions take in energy from the surroundings. Everyday uses of these reactions What is meant by the collision theory. HT: Explain energy changes from bonds breaking/making. TRIPLE: The overall reaction in hydrogen fuel cells	Rate of reaction can be described as change in substance over time. The difference between pure and impure substances. The definition of a formulation and some everyday formulations. The positive tests for Hydrogen, Oxygen, Chlorine and Carbon dioxide. The process of flame emission spectroscopy to identify metal ions and the advantages and disadvantages.
What will students understand?	How the structure of the atom has changed due to new experimental evidence. How the elements are arranged on the periodic table How the periodic table has changed over time How the position on the periodic table relates to the properties of the elements.	How different metals can be extracted from their ores depending on their reactivity	How compounds can be electrolysed to separate into their elements.	How balanced equations show that mass is conserved Why observed changes of mass in non-enclosed systems arise. Why it is not possible to obtain 100% yield	Endo/exo reactions can be described using temperature changes. Particles require the minimum amount of energy for a reaction to occur (Ea) TRIPLE: How simple cells and batteries produce electricity. TRIPLE: why alkaline batteries are non rechargeable but some are.	How rate of reaction is affected by concentration, temperature, pressure, surface area and use of a catalyst. How impurities affect melting/boiling point.

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What will students be able to do?	Write balanced symbol equations for reactions Calculate the number of subatomic particles in an atom Draw the electronic structure of atoms Separate mixtures using different techniques Identify metals and non-metals on the periodic table	Use the reactivity series to predict outcomes of displacement reactions Recall the reactions of metals and water/acids in relation to their reactivity	Predict the products of electrolysis of molten and aqueous solutions Produce a pure dry sample of salt from insoluble oxides. HT: Write half equations for redox reactions TRIPLE: Carry out a titration and calculate the concentration of an unknown substance.	Balance simple equations Calculate relative formula mass of compounds and use this to show that mass is conserved Calculate uncertainty of measurements. Calculate the concentration of substances in g/dm^3 HT: calculate the amount of substances in moles/mol/dm^3 HT: Use moles to balance equations HT: Calculate masses of substances when given a balanced equation, including calculations of limiting reactants. TRIPLE: Calculate theoretical amounts of product. TRIPLE: Calculate atom economy. TRIPLE: Calculate the volume of gas.	Draw, label and interpret reaction profiles. Investigate the variables that affect temperature changes in reacting solutions. HT: Calculate the overall energy change of a reaction and state whether this is endo/exo. TRIPLE: Compare fuel cells and rechargeable cells/batteries. TRIPLE: Write the half equations for hydrogen fuel cells.	Calculate the rate of reactions in g/s or cm^3/s. Draw and interpret graphs showing the rate of reaction and calculate using the graph. HT: Calculate the rate of reaction using a tangent line on a graph. Use the collision theory to explain changes in rate of reaction. Carry out and calculate the Rf value from a chromatogram. Identify unknown ions using the flame test, silver nitrate, barium chloride and sodium hydroxide.
How will they be formally assessed?	End of Topic Test: Explain the reactivity of the different groups in the periodic table.	End of Topic Test in Spring 1	End of Topic Test: Explain how some metals are extracted from their ores using carbon Use the reactivity series to predict the products of electrolysis of different solutions.	End of Topic Test: Calculate the mass of the reactants and the products in a chemical reaction.	End of Topic Test: Draw and label reaction profiles for endo and exothermic reactions. HT: Calculate the change in energy when bonds are broken or made.	End of Topic Test: Explain rate of reaction based on collision theory. Identify unknown substances using simple tests