

Term	INTENT	IMPLEMENTATION	IMPACT
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Disciplinary Knowledge (Skills) This is the action taken within a particular topic in order to gain substantive knowledge.	Assessment opportunities What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Autumn Term Y10 Term 1	C3.1 Introducing Chemical reactions: This topic explains that A chemical equation represents, in symbolic terms, the overall change in a chemical reaction. New materials are formed through chemical reactions but mass will be conserved. This can be explained by a model involving the rearrangement of atoms. Avogadro gave us a system of measuring the amount of a substance in moles. Students should be familiar with chemical symbols and formulae for elements and compounds. They should also be familiar with representing chemical reactions using formulae and equations. Students will have knowledge of conservation of mass, changes of state and chemical reactions.	<ul style="list-style-type: none"> • C3.1a use chemical symbols to write the formulae of elements and simple covalent and ionic compounds. • C3.1b use the names and symbols of common elements and compounds and the principle of conservation of mass to write formulae and balanced chemical equations and half equations. • use the names and symbols of common elements from a supplied Periodic Table to write formulae and balanced chemical equations where appropriate. • C3.1d use the formula of common ions to deduce the formula of a compound. • C3.1e construct balanced ionic equations. • C3.1f describe the physical states of products and reactants using state symbols (s, l, g and aq) • C3.1g recall and use the definitions of the Avogadro constant (in standard form) and of the mole. • C3.1h explain how the mass of a given substance is related to the amount of that substance in moles and vice versa. • C3.1i recall and use the law of conservation of mass. 	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of C3.1 test. End of Year assessments.

	<p>C3.2 Energetics : Summary Chemical reactions are accompanied by an energy change. A simple model involving the breaking and making of chemical bonds can be used to interpret and calculate the energy change. Underlying knowledge and understanding Learners should be familiar with exothermic and endothermic chemical Reactions. Common misconceptions Students commonly have the idea that energy is lost or used up. They do not grasp the idea that energy is transferred. Learners also wrongly think that energy is released when bonds break and do not link this release of energy with the formation of bonds. They also may think for example that a candle burning is endothermic because heat is needed to initiate the reaction.</p>	<ul style="list-style-type: none"> • C3.1j explain any observed changes in mass in non-enclosed systems during a chemical reaction and explain them using the particle model. • C3.1k deduce the stoichiometry of an equation from the masses of reactants and products and explain the effect of a limiting quantity of a reactant. • C3.1l use a balanced equation to calculate. • masses of reactants or products <p>-----</p> <ul style="list-style-type: none"> • C3.2a distinguish between endothermic and exothermic reactions based on the temperature change of the surroundings. • C3.2b draw and label a reaction profile for an exothermic and an endothermic reaction. • C3.2c explain activation energy as the energy needed for a reaction to occur. • C3.2d calculate energy changes in a chemical reaction by considering bond making and bond breaking energies 	<p>Measuring the temperature change in reactions. (PAG C8)</p>
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<p>Autumn Term Y10 Term 2</p>	<p>C3.3 Types of chemical reactions Summary Chemical reactions can be classified according to changes at the atomic and molecular level. Examples of these include reduction, oxidation and neutralisation reactions. Underlying knowledge and understanding Learners should be familiar with combustion, thermal decomposition, oxidation, and displacement reactions. They will be familiar with defining acids and alkalis in terms of neutralisation reactions. Learners will have met reactions of acids with alkalis to produce a salt and water and reactions of acids with metals to produce a salt and hydrogen. They should have met the pH scale for measuring acidity and alkalinity, and some indicators. Common misconceptions Students commonly intuitively adhere to the idea that hydrogen ions in an acid are still part of the molecule, not free in the solution. They tend to have little understanding of pH, for example, they tend to think that alkalis are less corrosive than acids. Learners also may think that the strength of acids and bases and concentration mean the same thing.</p>	<ul style="list-style-type: none"> • C3.3a explain reduction and oxidation in terms of loss or gain of oxygen, identifying which species are oxidised and which are reduced. • C3.3b explain reduction and oxidation in terms of gain or loss of electrons, identifying which species are oxidised and which are reduced. • C3.3c recall that acids form hydrogen ions when they dissolve in water and solutions of alkalis contain hydroxide ions. • C3.3d describe neutralisation as acid reacting with alkali or a base to form a salt plus water. • C3.3e recognise that aqueous neutralisation reactions can be generalised to hydrogen ions reacting with hydroxide ions to form water. • C3.3f recall that carbonates and some metals react with acids and write balanced equations predicting products from given reactants. • C3.3g use and explain the terms dilute and concentrated (amount of substance) and weak and strong (degree of ionisation) in relation to acids ratio of amount of acid to volume of solution. • C3.3h recall that relative acidity and alkalinity are measured by pH 	<p>In class teacher assessment through Q & A</p> <p>Knowledge recall activity</p> <p>Homework to develop fluency, problem solving, reasoning and mastery.</p> <p>Teacher assessment during lesson</p> <p>End of C3.3 test</p> <p>To be included in End of Year assessments</p>

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<p>Autumn Term Y10 Term 2</p>		<p>C3.3i describe neutrality and relative acidity and alkalinity in terms of the effect of the concentration of hydrogen ions on the numerical value of pH (whole numbers only) pH of titration curves WS1.4a Neutralisation reactions. (PAG C6) C3.3j recall that as hydrogen ion concentration increases by a factor of ten the pH value of a solution decreases by a factor of one C3.3k describe techniques and apparatus used to measure pH the use of universal indicator and pH meters</p>	<p>In class teacher assessment through Q & A</p> <p>Knowledge recall activity</p> <p>Homework to develop fluency, problem solving, reasoning and mastery.</p> <p>Teacher assessment during lesson</p> <p>End of unit C3.3 test; To be included in End of Year assessments. Determining pH of unknown solutions. (PAG C6) Use of pH probes. (PAG C6)</p>
<p>Spring Term Y10 Term 1</p>	<p>C3.4: Summary Decomposition of a liquid during the conduction of electricity is a chemical reaction called electrolysis. This section explores the electrolysis of various molten ionic liquids and aqueous ionic solutions. Underlying knowledge and understanding Learners should be familiar with ionic solutions and solids. Common misconceptions A common misconception is that ionic solutions conduct because of the movement of electrons. Another common misconception is that ionic solids do</p>	<ul style="list-style-type: none"> • compare the industrial production of fertilisers with laboratory syntheses of the same products. • recall the importance of nitrogen, phosphorus, and potassium compounds in agricultural production. • describe the industrial production of fertilisers as several integrated processes using a variety of raw materials. • explain the importance of the Haber process in agricultural production. • Explain the importance of the contact process. • explain, using the position of carbon in the reactivity series, the principles of industrial processes used to 	<p>In class teacher assessment through Q & A</p> <p>Knowledge recall activity</p> <p>Homework to develop fluency, problem solving, reasoning and mastery.</p> <p>Teacher assessment during lesson</p> <p>End of 3.4 test</p>

	not conduct electricity because electrons cannot move. I	extract metals, including extraction of a non-ferrous metal. <ul style="list-style-type: none"> explain why and how electrolysis is used to extract some metals from their ores. 	To be included in End of Year assessments In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of module 3 test To be included in End of Year assessments
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Spring Term Y10 Term 2	Topic C4: Predicting and identifying reactions and products	<ul style="list-style-type: none"> C4.1a : recall the simple properties of Groups 1, 7 and 0 physical and chemical properties C4.1b : explain how observed simple properties of Groups 1, 7 and 0 depend on the outer shell of electrons of the atoms and predict properties from given trends down the groups ease of electron gain or loss; 	<ul style="list-style-type: none"> Displacement reactions of halogens with halides. (PAG C1)
	C4.1 Predicting chemical reactions: Summary: Models of how substances react and the different types of chemical reactions that can occur enable us to predict the likelihood and outcome of a chemical reaction.		

	<p>The current Periodic Table was developed based on observations of the similarities and differences in the properties of elements. The way that the Periodic Table is arranged into groups and periods reveals the trends and patterns in the behaviour of the elements. The model of atomic structure provides an explanation for trends and patterns in the properties of elements. The arrangement of elements in groups and periods reveals the relationship between observable properties and how electrons are arranged in the atoms of each element.</p> <p>Underlying knowledge and understanding: Students should be familiar with the principles underpinning the Mendeleev Periodic Table; the Periodic Table: periods and groups; metals and non-metals.</p> <p>The varying physical and chemical properties of different elements.</p> <p>The chemical properties of metals and non-metals.</p> <p>The chemical properties of metal and non-metal oxides with respect to acidity and how patterns in reactions can be predicted with reference to the Periodic Table.</p> <p>Common misconceptions: Students consider the properties of particles of elements to be the same as the bulk properties of that element. They tend to rely on the continuous matter model rather than the particle model. Learners confuse state changes and dissolving with chemical changes.</p>	<ul style="list-style-type: none"> • physical and chemical properties • C4.1c : recall the general properties of transition metals and their compounds and exemplify these by reference to a small number of transition metals melting point, density, reactivity, formation of coloured ions with different charges and uses as catalysts • C4.1d : predict possible reactions and probable reactivity of elements from their positions in the Periodic Table • C4.1e : explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion • C4.1f : deduce an order of reactivity of metals based on experimental results 	<ul style="list-style-type: none"> • Investigation of transition metals. • (PAG C1, PAG C5, PAG C8) • Reaction of metals with water, dilute hydrochloric acid. PAG C1, PAG C7, PAG C8) • Displacement reactions involving metals and metal salts. (PAG C1, PAG C7, PAG C8)
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	<p>Also, since the atmosphere is invisible to the eye and learners rely on concrete, visible information, this means they therefore often avoid the role of oxygen in their explanations for open system reactions.</p> <p>Even if the role of oxygen is appreciated, students do not realise that solid products of an oxidation reaction have more mass than the starting solid.</p>		
<p>Summer Term Y10 Term 1</p>	<p>C4.2 Identifying the products of chemical reactions</p> <p>Summary: Types of substances can be classified according to their general physical and chemical properties. This section explores the tests that can be used to identify the products of reactions by looking at their physical and chemical properties.</p> <p>Underlying knowledge and understanding Learners should be familiar with cations and anions from their work on electrolysis.</p> <p>Common misconceptions: Students confuse mass and density so in reactions involving change of state, Students reason that the products from a precipitation reaction are heavier than the starting materials and that when a gas is produced the reaction has lost mass.</p>	<ul style="list-style-type: none"> • C4.2a: describe tests to identify selected gases oxygen, hydrogen, carbon dioxide and chlorine. • C4.2b: describe tests to identify aqueous cations and aqueous anions calcium, copper, iron (II), iron (III) and zinc using sodium hydroxide. • carbonates and sulphates using aqueous barium chloride followed by hydrochloric acid; chloride, bromide and iodide using silver nitrate. • C4.2c: describe how to perform a flame test. • C4.2d: Identify species from test results Testing unknown solutions for cations and anions. (PAG C5) • C4.2e: interpret flame tests to identify metal ions the ions of lithium, sodium, potassium, calcium and copper. • C4.2f: describe the advantages of instrumental. • methods of analysis sensitivity, accuracy, and speed • C4.2g: interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set of data in the same form the features of a mass spectroscopy chart. 	<ul style="list-style-type: none"> • Tests for cations using sodium hydroxide. (PAG C5) • Tests for anions using silver nitrate and barium sulphate. (PAG C5) • Flame tests. (PAG C5) • End of module 4 test

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