	Chemistry Unit 1				
		Syllabus point (text abridged)	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C1(a)	Topic 5 – Patterns in Properties	Explain how to use flame tests to identify the presence of a particular metal. (C1a 5.1)		Alkali Metals	Chemical Analysis – Chemical Techniques
		Use given analytical data to identify substances covered in this topic area, e.g. crime scene analysis. (C1a 5.2)			Chemical Analysis – Instrumental Techniques
		Interpret data to describe the properties of chlorine, iodine, helium, neon, argon, iron, copper, silver and gold, and explain their uses. (C1a 5.3)		The Halogens The Noble Gases The Transition Metals	
		Interpret data of the colours formed by transition metals with sodium hydroxide solution to identify iron, copper and zinc. (C1a 5.4)		The Transition Metals Chemical Reactions	Chemical Analysis – Chemical Techniques
		Use the periodic table to find the symbol of an element. (C1a 5.5)		Patterns in the Periodic Table	
		Identify and recall the position of metals and non-metals in the periodic table. (C1a 5.6)		Patterns in the Periodic Table	
		Locate the positions in the periodic table of: – alkali metals – the halogens – the noble gases – transition metals. (C1a 5.7)		Patterns in the Periodic Table The Alkali Metals The Halogens The Noble Gases The Transition Metals	
		Recall that elements with similar properties appear in the same vertical column (group). (C1a 5.8)		Patterns in the Periodic Table	
		Using secondary data to explore why elements are arranged in rows (periods) and columns (groups). (C1a 5.9)		Patterns in the Periodic Table	
		Explain that an atom consists of positive protons and neutrons in a nucleus surrounded by negative electrons. (C1a 5.10)		Atomic Structure	
		Understand that the periodic table is an example of how a scientific theory can predict the discovery of new elements. (C1a 5.11)		Patterns in the Periodic Table	
		HT Use secondary data to explore how the periodic table was devised, with reference to atomic number. (C1a 5.12)		Patterns in the Periodic Table	

		Explain that all atoms of the same element have the same number of protons in their nuclei and demonstrate understanding that the atomic number is the number of protons in the nucleus of an atom of an element and is unique to that element. (C1a 5.13)		**Atomic Structure** **Patterns in the Periodic Table**	
		Recall the variations in reactivity of the alkali metals with increasing atomic number as shown by their reactivity with water. (C1a 5.14)		**The Alkali Metals**	
		Recall that chemical reactions happen at different rates. (C1a 5.15)		**Rates of Reactions**	
		Recall that some chemical reactions give out heat (exothermic) and some take in heat (endothermic). (C1a 5.16)		**Energy Transfer** **Reversible Reactions**	
		Recall that there is usually a gradual change in properties of the elements with increasing atomic number. (C1a 5.17)		**Patterns in the Periodic Table**	
		Recall the variation in colour, physical states at room temperature and the trends in boiling points of the halogens. (C1a 5.18)		**The Halogens**	
		Describe the variation in reactivity of the halogens with atomic number, as shown by displacement reactions. (C1a 5.19)		**The Halogens**	
		Describe the noble gases as chemically unreactive compared with other elements. (C1a 5.20)		**The Noble Gases**	
		Explain that elements in the same group of the periodic table have similar chemical properties, as exemplified by the halogens. (C1a 5.21)		**The Alkali Metals** **The Halogens** **The Noble Gases** **Patterns in the Periodic Table**	
		HT Explain the use of the endings –ide and –ate in the names of common chemical compounds. (C1a 5.22)			

		Chemistry Unit 1			
		Syllabus point (text abridged)	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C1(a)	Topic 6 – Making Changes	Describe how neutralization can be used to make salts, some of which may be used in fertilizers, and in fireworks as colouring agents. (C1a 6.1)		Chemical Reactions	
		Describe the reactions of dilute sulfuric and hydrochloric acids with metal oxides, carbonates and hydroxides. (C1a 6.2)		Chemical Reactions	
		Describe the preparation of pure, dry samples of insoluble salts from solutions of soluble salts. (C1a 6.3)			Chemical Analysis – Chemical Techniques
		Explain that most metals have to be extracted from their ores, which are found in the Earth's crust. (C1a 6.4)	Metals and Alloys Extracting Metals		
		Explain that some metals occur as their oxides and can be extracted by reaction with carbon e.g. iron, copper and lead. (C1a 6.5)	Extracting Metals		
		Explain that the addition of oxygen to a substance is oxidation e.g. the formation of magnesium oxide from magnesium and oxygen. (C1a 6.6)		Electro-chemistry	Further Electro-chemistry
		Explain that the loss of oxygen from a substance is reduction e.g. the formation of copper from copper oxide. (C1a 6.7)	Extracting Metals	Electro-chemistry	Further Electro-chemistry
		Recall that the least reactive metals are found uncombined in the Earth's crust. (C1a 6.8)	Metals and Alloys Extracting Metals		
		Relate the order of reactivity of metals to the stability of their ores, and the method used for their extraction. (C1a 6.9)	Metals and Alloys Extracting Metals		
		Discuss the differences between 'natural' and 'artificial' substances, including whether they can be distinguished or are chemically different, and any impacts on health. (C1a 6.10)	Food Chemistry		
		Recall that baking powder contains sodium hydrogen carbonate and an acidic substance, and describe how these two compounds react to produce carbon dioxide during cooking (C1a 6.11)	Food Chemistry		
		Recall that when carbonates and hydrogen carbonates are heated they release carbon dioxide gas and that this is called thermal decomposition. (C1a 6.12)	Food Chemistry Building Materials and Rocks	Chemical Reactions The Transition Metals	

		Describe the processes of hydration and dehydration. (C1a 6.13)			
		Recognise cooking processes as chemical changes leading to new products (C1a 6.14)	**Food Chemistry**		
		HT Interpret data linking a chemical in food with a health impact, recognising that a correlation does not imply a cause (C1a 6.15)			
		Know how to test for: – hydrogen – oxygen – carbon dioxide – ammonia – chlorine. (C1a 6.16)		**Chemical Reactions** **Electro-chemistry**	**Chemical Analysis – Chemical Techniques**
		Know how to collect gases produced in reactions by upward and downward delivery, over water and using a gas syringe and relate this to the solubility and density of the gas. (C1a 6.17)			**Further Quantitative Chemistry**
		Describe the use of hazard labels in the chemistry laboratory. (C1a 6.18)			
		Investigate and identify the uses of the following common compounds: – ammonia – carbohydrates – carbon dioxide – caustic soda – citric acid – ethanoic (acetic) acid – hydrochloric acid – phosphoric acid – sodium chloride (common table salt) – water (C1a 6.19).	**Building Materials and Rocks**	**Reversible Reactions** **Chemical Reactions**	**Understanding Acids and Alkalis** **Soap and Water**

		Chemistry Unit 1			
		Syllabus point (text abridged)	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C1(b)	Topic 7 – There's One Earth	Discuss how the idea of global warming went from a single scientist's idea to a widely accepted theory. (C1b 7.1)	Earth's Atmosphere Climate Change		
		Recall that hydrocarbons contain hydrogen and carbon only and explain that the products of complete combustion of hydrocarbons are carbon dioxide and water and that energy is released. (C1b 7.2)	Combustion and Alternative Fuels		
		Explain how burning fossil fuels may lead to global warming. (C1b 7.3)	Earth's Atmosphere Climate Change		
		Discuss how the composition of the Earth's atmosphere and its temperature have varied over different time scales. (C1b 7.4)	Earth's Atmosphere Climate Change		
		Recognise that predictions about the amount of warming of the Earth are based on computer models, which carry uncertainties. (C1 b 7.5)	Climate Change		
		HT Propose an argument, based on the precautionary principle, for how to combat global warming. (C1b 7.6)	Climate Change		
		Explain the importance of recycling waste products such as glass, metal and papers. (C1b 7.7)	Human Impact on the Environment		
		Evaluate a range of economic, environmental considerations of recycling a natural material, such as glass, metal, or the desalinization of water in hot countries. (C1b 7.8)	Human Impact on the Environment (Biology)		
		Explore how sustainable development involves balancing the need for economic development, standards of living, and respect for the environment. (C1b 7.9)	Sustainability (Biology)		
		Demonstrate an understanding of how the internet can be used to research up-to-date data and information about acid rain or global warming, how to check these for authenticity and bias, and how to critically analyse and incorporate such data and information into their own work. (C1b 7.10)			
		Describe the properties of a useful fuel, including: – sootiness – colour – heat energy – residue (C1b 7.11)	Making Oil Useful Fractions from Oil		

		Explain why bio-fuels are sometimes an attractive alternative to fossil fuels. (C1b 7.12)	**Combustion and Alternative Fuels**		
		Discuss the benefits and drawbacks of car fuel being changed from petrol to hydrogen fuel. (C1b 7.13)	**Combustion and Alternative Fuels**		**Food and Fuels**
		Explain that ethanol obtained from sugar cane or sugar beet, is a useful bio-fuel which can be used to reduce the demand for petrol, but large areas of fertile land have to be used. (C1b 7.14)	**Combustion and Alternative Fuels**		**Other Uses for Micro-organisms (Biology)**
		Describe the fractional distillation of crude oil. (C1b 7.15)	**Making Oil Useful**		
		Describe the uses of the main fractions of crude oil (gases, petrol, naphtha, kerosene, diesel oil, fuel oil, bitumen). (C1b 7.16)	**Making Oil Useful Fractions from Oil**		
		HT Explain where the main fractions of crude oil (gases, petrol, naphtha, kerosene, diesel oil, fuel oil, bitumen) are produced on the fractionating column and relate this to their boiling points, sizes of their molecules, viscosity, ease of ignition and uses. (C1b 7.17)	**Making Oil Useful Fractions from Oil**		
		Explain that incomplete combustion can occur in faulty gas appliances and other heating appliances and that this can be dangerous. (C1b 7.18)	**Earth's Atmosphere**		
		Explain that incomplete combustion can produce carbon and carbon monoxide. (C1b 7.19)	**Combustion and Alternative Fuels**		
		Recall that carbon monoxide is a toxic gas and explain that it lowers the ability of blood to carry oxygen. (C1b 7.20)	**Combustion and Alternative Fuels**		
		Interpret and evaluate given data relating respiratory diseases such as asthma to atmospheric pollutants. (C1b 7.21)	**Earth's Atmosphere**		
		Describe how nitrogen and oxygen can be obtained by fractional distillation of liquid air. (C1 b 7.22)			
		Identify the useful substances obtained from seawater and rock salt: – sodium – chlorine – sodium chloride – hydrogen – sodium hydroxide (C1b 7.23)	**Building Materials and Rocks**		

		Chemistry Unit 1			
		Syllabus point	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C1(b)	Topic 8 – Designer Products	Use given information to relate properties to some of the uses of smart materials in clothing, extreme sports and sports equipment, including carbon fibres, Thinsulate™, Lycra™, etc. (C1b 8.1)	Designer Materials		
		Explain that smart materials can change their properties in response to an external stimulus. (C1b 8.2)	Designer Materials		
		Explore how scientists sometimes create new materials with novel properties, such as Teflon™ and the adhesives on 'Post-it' notes, where the applications only emerge afterwards. (C1b 8.3)	Designer Materials		
		Explain the breathability of fabrics like Goretex™ in terms of their structure. (C1b 8.4)	Designer Materials		
		Demonstrate that the properties of material such as Kevlar™ will dictate its use. (C1b 8.5)	Designer Materials		
		Compare the size of nanoparticles to that of conventional industrially produced materials, and relate this to their present uses, such as sunscreens and future applications. (C1b 8.6)	Designer Materials	Nano-technology	
		HT Explore the risks and uncertainties of nanotechnologies, and how they are presented in the media. (C1b 8.7)	Designer Materials	Nano-technology	
		Describe how beer and wine can be made by fermentation reactions using yeast to convert sugars to alcohol. (C1b 8.8)	Food Chemistry		Using Micro-organisms for food (Biology)
		Discuss the social issues and possible harmful effects of ethanol in alcoholic drinks. (C1b 8.9)	Food Chemistry		
		Use information on intelligent packaging to explain ways of keeping food fresh, such as by removal of water or preventing reactions with oxygen. (C1 b 8.10)	Designer Materials		
		Describe how emulsifiers, that have a 'water loving' (hydrophilic) part and an 'oil loving' (water hating/hydrophobic) part, work in foods like mayonnaise. (C1 b 8.11)	Food Chemistry		
		HT Design a list of properties for a product, based on its end use. (C1 b 8.12)			

C2	Chemistry Unit 2				
		Syllabus point	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
	Topic 5 - Synthesis	Investigate cracking within the laboratory. (C2 5.1)	Making Oil Useful		
		Explain that cracking involves the breaking down of larger hydrocarbon molecules into smaller, more useful ones. (C2 5.2)	Making Oil Useful		
		Recall that when alkanes are cracked, mixtures of alkanes and alkenes are formed. (C2 5.3)	Making Oil Useful		
		Explain that alkanes are saturated hydrocarbons, containing single covalent bonds, and that alkenes are unsaturated hydrocarbons containing double covalent bonds. (C2 5.4)	Making Oil Useful		
		Recall the formulae of methane, ethane, propane, butane; and draw the structures of their molecules. (C2 5.5)	Making Oil Useful		
		Recall the formulae of ethene and propene and draw the structures of their molecules. (C2 5.6)	Making Oil Useful		
		Describe how bromine water is used to distinguish between alkanes and alkenes. (C2 5.7)	Making Oil Useful		
		Demonstrate understanding that the ability of a carbon atom to form four stable covalent bonds results in a large number of carbon compounds. (C2 5.8)			
		Discuss how modern society depends on oil and predict the consequence when supplies begin to run out. (C2 5.9)	Making Oil Useful Combustion and Alternative Fuels		
		Explain why some vegetable oils are referred to as 'polyunsaturated' or 'monounsaturated'. (C2 5.10)	Food Chemistry		
		Explain why polyunsaturated oils are far less viscous than saturated ones. (C2 5.11)	Food Chemistry		
		Describe how vegetable oil can be hydrogenated to form hydrogenated vegetable oil and what this is used for in the food industry. (C2 5.12)	Food Chemistry		
		HT Explain how ethene can be reacted with water to make ethanol. (C2 5.13)			CFCs and Alcohols
		Recall that polymers are large molecules which can be formed by a combination of many smaller molecules. (C2 5.14)	Making Polymers		
		Draw repeating units of addition polymers given the monomer and vice versa. (C2 5.15)	Making Polymers		

		Explain how addition polymers are formed from unsaturated monomers (equations required, but not conditions and mechanisms). (C2 5.16)	**Making Polymers**		
		Predict uses of polymers given appropriate information about their properties [NB. no recall expected]. (C2 5.17)	**Making Polymers**		
		Explain the similarities and differences between thermosetting and thermoplastic polymers in terms of their structure. (C2 5.18)	**Making Polymers**		
		Explain how the properties of a plastic can be altered, depending on the starting materials, conditions of reaction, and additives (limited to plasticisers, preservatives and cross linking), and relate this to their structure and bonding. (C2 5.19)	**Making Polymers**		
		Discuss the problems of disposing of some plastics, including non-biodegradability and breakdown to toxic products. (C2 5.20)	**Making Polymers**		
		Discuss the issue of toxicity to humans in how chemists synthesise new substances. (C2 5.21)			**The Chemical Industry**
		Demonstrate understanding that chemists use information about known reactions to make new compounds and predict the products of a reaction given the reactants and products of similar reactions. (C2 5.22)			
		HT Use the formula: mass of useful product ÷ total mass of product × 100% to calculate the 'atom economy' of a reaction. (C2 5.23)			**The Chemical Industry**
		Demonstrate understanding that reactions with a high atom economy are important for sustainable development as they prevent waste. (C2 5.24)		**Quantitative Chemistry**	**The Chemical Industry**
		Calculate relative formula mass from relative atomic masses. (C2 5.25)		**Quantitative Chemistry**	
		Calculate the formulae of simple compounds from reacting masses and understand that these are empirical. (C2 5.26)			**Further Quantitative Chemistry**
		HT Use chemical equations to calculate masses of reactants and products. (C2 5.27)		**Quantitative Chemistry**	
		HT Calculate theoretical and percentage yields of reactions. (C2 5.28)		**Quantitative Chemistry**	
		Describe how stage methods of synthesis are used in drug development to speed up discovery of effective substances. (C2 5.29)			
		HT Calculate the number of possible products from a staged synthesis experiment, involving no more than four stages, given appropriate data. (C2 5.30)			

		Chemistry Unit 1			
		Syllabus point	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C2	Topic 6 – In Your Element	Describe and explain the physical properties of metals, including conductivity, malleability, hardness and high melting/boiling points. (C2 6.1)	Metals and Alloys	Covalent Bonding The Alkali Metals The Transition Metals	
		Describe and explain how alloying can change the properties of metals. (C2 6.2)	Metals and Alloys		
		Recall the relative charges and relative masses of protons, neutrons and electrons. (C2 6.3)		Atomic Structure	
		Explain the terms atomic number, mass number and relative atomic mass. (C2 6.4)		Atomic Structure	
		Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by orbiting electrons arranged in shells. (C2 6.5)		Atomic Structure	
		Recall that an ion is an atom or group of atoms with a positive or negative charge. (C2 6.6)		Ionic Bonding	
		Explain that ionic bonds can be made by the transfer of electrons to form positive and negative ions. (C2 6.7)		Ionic Bonding	
		Describe the formation of sodium ions (Na^+) and chloride ions (Cl^-), and hence predict the formation of ions in other ionic compounds, from their atoms. (C2 6.8)		Ionic Bonding	
		Describe and explain the physical properties of giant ionic structures e.g. sodium chloride (NaCl); their regular crystal shape, high melting and boiling points, and ability to conduct when molten and in solution. (C2 6.9)		Ionic Bonding	
		Write the formula of ionic compounds, given the charges on the ions. (C2 6.10)		Electro-chemistry	
		HT Predict the products of electrolysis of a given molten binary salt, and write balanced half equations for the electrode reactions. (C2 6.11)		Electro-chemistry	Further Electro-chemistry
		Recall that electrolysis is the movement of ions towards oppositely charged electrodes. (C2 6.12)		Electro-chemistry	
		Explain the existence of isotopes. (C2 6.13)		Atomic Structure	
		HT Calculate the relative atomic mass of an element from the relative masses and abundance of its isotopes. (C2 6.14)		Quantitative Chemistry	

		Explain that reactions of an element depend upon the arrangement of electrons in the outer shell of its atoms. (C2 6.15)		**Atomic Structure** **Ionic Bonding**	
		Describe the connection between the number of outer electrons and the position of an element in the periodic table. (C2 6.16)		**Patterns in the Periodic Table**	
		Explain the lack of reactivity of the noble gases in terms of the electron configuration of their atoms. (C2 6.17)		**The Noble Gases**	
		Write down the electronic configurations of the first 20 elements in the periodic table, given the atomic numbers, either as electron shell diagrams or in the form e.g. 2, 8, 1. (C2 6.18)		**Atomic Structure** **Patterns in the Periodic Table**	
		Explain the trends in the reactivity of the alkali metals and halogens in terms of their electron configuration. (C2 6.19)		**The Alkali Metals** **The Halogens**	
		Appreciate how creative insight influenced the discovery of the elements of the periodic table, e.g. Mendeleev's understanding in predicting the properties of silicon before it was discovered. (C2 6.20)		**Patterns in the Periodic Table**	

		Chemistry Unit 2			
		Syllabus point	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C2	Topic 7 – Chemical Structures	Recognise the importance of chance in scientific discoveries such as Buckminster fullerenes. (C2 7.1)		Nano-technology	
		Recall that Buckminster fullerene and carbon nanotubes are also forms of carbon. (C2 7.3)		Nano-technology	
		Suggest uses for fullerenes and nanotubes, given data about their properties. (C2 7.2)		Nano-technology	
		Describe and explain the physical properties of simple covalent molecular substances: low melting/boiling points and non-conductivity. (C2 7.4)		Covalent Bonding	
		HT Use appropriate information to draw conclusions about whether a chemical-based therapy is effective. (C2 7.5)			
		Describe how ideas, such as the effectiveness of homeopathic medicine, are difficult for scientists to accept when they conflict with established theories. (C2 7.6)			
		Recall that metals conduct electricity because there are relatively free electrons in a giant structure of atoms. (C2 7.7)	Metals and Alloys		
		HT Relate the physical properties of the halogens to their intermolecular forces of attraction. (C2 7.8)		The Halogens	
		Describe how covalent bonds can be made by electron sharing to form small molecules, or giant structures like diamond and graphite. (C2 7.9)		Covalent Bonding	
		HT Draw dot and cross diagrams of simple molecules including hydrogen (H_2), hydrogen chloride (HCl), water (H_2O) and carbon dioxide (CO_2). (C2 7.10)		Covalent Bonding	
		Describe and explain the similarities and differences in physical properties between the giant covalent structures of diamond and graphite, including high melting/boiling points, hardness and conductivity. (C2 7.11)		Covalent Bonding	
		HT Demonstrate an understanding of the limitations of representing models of atoms and molecules in two dimensions, and how simulation software can create three dimensional representations to clarify understanding. (C2 7.12)			

		Chemistry Unit 2			
		Syllabus point	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C2	Topic 8 – How fast? How furious?	Recall that exothermic reactions are accompanied by an increase in temperature and endothermic reactions by a decrease in temperature. (C2 8.1)		Energy Transfer Reversible Reactions	
		Define an exothermic reaction as one in which heat energy is given out and an endothermic reaction as one in which heat energy is taken in, and give examples. (C2 8.2)		Energy Transfer Reversible Reactions	
		Recall that the breaking of bonds is endothermic and that the making of bonds is exothermic. (C2 8.3)		Energy Transfer	
		Describe and explain the effect of changes in temperature, concentration and surface area of a solid on a given rate of reaction. (C2 8.4)		Rates of Reaction	
		Describe experiments to investigate the effect of temperature, concentration and surface area of a solid on the rate of a reaction. (C2 8.5)		Rates of Reaction	
		Describe the effect of a catalyst on the rate of reaction, interpreting results of experiments, given data. (C2 8.6)		Rates of Reaction	The Chemical Industry
		Explain that reactions can occur when particles collide and that increasing the frequency and energy of collisions increases the rate of the reaction. (C2 8.7)		Rates of Reaction	
		Recall that enzymes are biological catalysts, and the importance of speeding up chemical reactions to the maintenance of life. (C2 8.8)		Rates of Reaction	
		Describe the conditions under which ammonia is produced from nitrogen and hydrogen in the Haber process. (C2 8.9)		Reversible Reactions	
		Understand that some chemical reactions are reversible and may reach equilibrium. (C2 8.10)		Reversible Reactions	
		Describe understanding of how the position of a dynamic equilibrium may be changed by temperature or pressure e.g. Haber process. (C2 8.11)		Reversible Reactions	
		Demonstrate understanding of the consequential effect of these changes on the rate of attainment of equilibrium and the possible need to use a catalyst. (C2 8.12)		Reversible Reactions	
		Explain that ammonia produced in the Haber process can be neutralized with nitric acid to produce artificial nitrogenous fertilisers. (C2 8.13)			
		Discuss the arguments for and against using natural and artificial fertilizers in farming. (C2 8.14)		Plant Growth (Additional: Biology)	

		Chemistry Unit 3			
		Syllabus point (text abridged)	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C3	Topic 3 – Chemical Detection	Why substances need to be identified and their purity determined. (C3 3.1)			
		Analysis may be qualitative or quantitative. (C3 3.2)			Chemical Analysis – Chemical Techniques
		Ionic substances are identified by identifying each type of ion they contain. (C3 3.3)			Chemical Analysis – Chemical Techniques
		Why the test for each ion must be unique. (C3 3.4)			Chemical Analysis – Chemical Techniques
		Precipitation reactions form the basis of some tests for ions. (C3 3.5)			Chemical Analysis – Chemical Techniques
		The tests for the following ions in solids or solutions as appropriate: - H^+ using acid / base indicators and typical acid reactions - Na^+, K^+, Ca^{2+}, Cu^{2+} using flame tests. - Al^{3+}, Ca^{2+}, Cu^{2+}, Fe^{2+},Fe^{3+}, NH_4^+ using sodium hydroxide solution. - CO_3^{2-} using dilute acid and identifying the carbon dioxide evolved - SO_3^{2-} using dilute hydrochloric acid and identifying the sulphur dioxide evolved. - SO_4^{2-} using dilute hydrochloric acid and barium chloride solution - Cl^-, Br^-, I^- using dilute nitric acid and silver nitrate solution. - OH^- using acid / base indicators and reaction when heated with an ammonium salt. (C3 3.6)		Chemical Reactions	Chemical Analysis – Chemical Techniques
		The amount of a substance can be measured in grams, number of particles or number or moles of particles. (C3 3.7)		Quantitative Chemistry	Further Quantitative Chemistry
		How to convert masses of substances into moles of particles of the substance and vice versa. (C3 3.8)		Quantitative Chemistry	Further Quantitative Chemistry
		To produce required amounts of product chemists must be able to calculate how much reactant to use. (C3 3.9)		Quantitative Chemistry	Further Quantitative Chemistry

		Calculate the mass of substances involved in reactions, given the relevant equation. (C3 3.10)		**Quantitative Chemistry**	
		The use of Avogadro's law to calculate the volumes of gases involved in reactions, given the relevant equations. (C3 3.11)			**Further Quantitative Chemistry**
		The amount of substance present in a solution can be determined by experiments involving mass or concentration determination. (C3 3.12)			**Soap and Water**
		How to determine the mass of substance dissolved in water by evaporating the water from a known mass of solution. (C3 3.13)			
		Calculating the volume of a given mass of gas (given the molar volume at the appropriate temperature and pressure) and vice versa. (C3 3.14)			**Further Quantitative Chemistry**
		Calculate and interrelate masses or volumes of substances involved in a reaction, given the relevant equation. (C3 3.15)		**Quantitative Chemistry**	**Further Quantitative Chemistry**
		Convert mass-concentration into moldm^{-3} and vice versa. (C3 3.16)			**Titrations**
		Titration can be used to determine the exact amount of a soluble substance dissolved in a solution. (C3 3.17)			**Titrations**
		The procedure for carrying out simple acid-base titrations using burette, pipette and suitable indicators. (C3 3.18)			**Titrations**
		Perform simple calculations from the results of titration. (C3 3.19)			**Titrations**
		How water is used in everyday life and why it is important not to waste it. (C3 3.20)			**Soap and Water**

		Chemistry Unit 3			
		Syllabus point (text abridged)	Boardworks Presentations		
			GCSE Science	Additional Science	Separate Sciences
C3	Topic 4 – Chemistry Working for Us	The characteristic physical properties of the common transition metals – high melting points, good conductors of heat and electricity and high density as exemplified by iron and copper (C3 4.1)	Metals and Alloys	The Transition Metals	
		Uses of transition metals and their compounds as catalysts and pigments. (C3 4.2)	Metals and Alloys	The Transition Metals	
		The useful chemical and physical properties of alcohols, carboxylic acids and esters. (C3 4.3)			CFCs and Alcohols Carboxylic Acids and Esters
		Uses of alcohols in cosmetics and preparations of esters, of salts of acids in soaps and detergents and of esters in cosmetics and fruit flavourings. (C3 4.4)			CFCs and Alcohols Carboxylic Acids and Esters
		That oxidation may involve the loss of electrons and reduction may involve the gain of electrons. (C3 4.5)		Electro-chemistry	Further Electro-chemistry
		The process of electrolysis to include the types of electrolytes, electrodes, half equations, movements of ions and electrical circuits. (C3 4.6)	Extracting Metals	Electro-chemistry	Further Electro-chemistry
		The purification of copper by electrolysis, including a simple diagram of the cell. (C3 4.7)	Extracting Metals	Electro-chemistry	
		That the alkali metals are soft and have comparatively low melting and boiling points. (C3 4.8)		The Alkali Metals	
		The reactions of lithium, sodium and potassium with water to form hydroxides and hydrogen gas. (C3 4.9)		The Alkali Metals	
		The use of sodium carbonate in producing glass and washing soda crystals. (C3 4.10)			Soap and Water
		The uses of sodium hydroxide to illustrate its economic importance in producing detergents, soaps and fibres, etc. (C3 4.11)			Soap and Water
		The manufacture of sulfuric acid from sulphur and sulphide ores. (C3 4.12)			Understanding Acids and Alkalis
		The operating conditions used in the 'Contact process'. (C3 4.13)			Understanding Acids and Alkalis
		The uses of sulfuric acid to illustrate its economic importance in producing fertilizers, detergents, soaps, dyes, fibres, plastics, paints etc. (C3 4.14)			Understanding Acids and Alkalis

		The preparation of soap from carboxylic acid and alkalis. (C3 4.15)			**Carboxylic Acids and Esters Soap and Water**
		The detergent action of surfactants in lowering surface tension to remove dirt and oil / grease. (C3 4.16)			**Soap and Water**
		The practical differences between 'biological' and 'non-biological' detergents. (C3 4.17)			**Soap and Water**
		The practical advantages of using detergents instead of soaps in hard water areas. (C3 4.18)			**Soap and Water**