GCSE Chemistry

Outline of Exams and RAG Checklists

This GCSE consists of 2 written exam papers, 100 marks each and lasting 1 hour 45 mins. The question styles include multiple choice, structured, closed short answer and open extended response. In addition to the checklists below, there will be questions relating to the required practical activities studied through the course and there will be calculations, so a calculator is required.

The paper 1 exam on 19th May 2025 (AM) includes Modules C1 to C5 Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry, Chemical changes; and Energy changes,.and is 50% of the grade.

The paper 2 exam on 13th June 2025 (AM) includes Modules C6 to C10 The rate and extent of chemical change; Organic chemistry; Chemical analysis, Chemistry of the atmosphere; and Using resources, and is 50% of the grade.

Below are the 10 Learning Journey Checklists for this GCSE. Bold statements are assessed on the higher tier paper only.

KS4 TRIPLE CHEMISTRY

C1 LEARNING JOURNEY

C1	Ref	SKILL	RAG
1.1 SIMPLE MODEL OF ATOM, SYMBOLS, RELATIVE ATOMIC MASS, CHARGE AND ISOTOPES	1.1.1	I can state that everything is made of atoms, which are the smallest part of an element that can exist, and all elements are shown in the periodic table	
	1.1.4	I can state the relative charge of protons, neutrons and electrons and describe the overall charge of an atom	
	1.1.5	I can state the relative masses of protons, neutrons and electrons and describe the distribution of mass in an atom	
	1.1.5	I can calculate the number of protons, neutrons and electrons in an atom when given its atomic number and mass number	
	1.1.7	I can describe how electrons fill energy levels in atoms, and I can represent the electron structure of elements using diagrams and numbers	
	1.1.3	I can describe how the atomic model has changed over time due to new experimental evidence, including the discovery of the atom and Rutherford and Marsden's scattering experiments	
	1.1.1	I can describe how compounds are made of different elements in fixed proportions, are formed by a chemical reaction and can only be separated into their constituent elements by a chemical reaction	
	1.1.1	I can state that elements and compounds are represented by symbols; and I can use chemical symbols and formulae to represent elements and compounds	
	1.1.5	I can describe isotopes as atoms of the same element with different numbers of neutrons	
	1.1.1	I can write word equations and balanced symbol equations for chemical reactions, including using appropriate state symbols	
	1.1.2	I can describe a mixture as two or more elements or compounds that are not chemically combined, where the properties of each substance are unchanged	
	1.1.2	I can name and describe the physical processes used to separate mixtures and suggest suitable separation techniques	
	1.2.1	I can state that the elements in the periodic table are arranged by atomic (proton) number from left to right in rows, called periods	

C1	Ref	SKILL	RAG
1.2 THE PERIODIC TABLE	1.2.1	I can describe how elements with similar properties are placed in columns, called groups, and elements in the same group in the periodic table have the same number of electrons in their outer shell	
	1.2.1	I can explain that elements in the same group have similar properties and the reactions of elements are related to the arrangement of electrons in their atoms, and I can use the periodic table to predict the reactivity of elements	
	1.2.3	I can identify metals and non-metals on the periodic table, compare and contrast their properties and explain that metals react to form positive ions and non-metals do not	
	1.2.2	I can describe the early attempts to classify elements by arranging them in order of atomic weight, problems with this approach, and how the discovery of isotopes explained why ordering by atomic weight was not always correct	
	1.2.2	I can explain the creation and attributes of Mendeleev's periodic table	
	1.2.3	I can explain how the atomic structure of metals and non-metals relates to their position in the periodic table	
	1.2.5	I can describe the reactivity and properties of group 1 alkali metals with reference to their electron arrangement and predict their reactions	
	1.2.6	I can describe the properties of group 7 halogens and how their properties relate to their electron arrangement, including trends in molecular mass, melting and boiling points and reactivity	
	1.2.6	I can describe the reactions of group 7 halogens with metals and non-metals, and explain how a more reactive halogen can displace a less reactive halogen in an aqueous solution of its salt	
	1.2.4	I can describe nobel gases (group 0) as being unreactive and explain that this is because they have a full outer shell of electrons	
	1.2.4	I can describe the properties of noble gases, including boiling points, predict trends down the group and describe how their properties depend on the outer shell of electrons	
1.3 TRANSITION METALS	1.3.1 1.3.2	**I can describe the properties of transition metals and compare them with group 1 elements, including melting points and densities, strength and hardness, and reactivity**	

KS4 TRIPLE CHEMISTRY

C2 LEARNING JOURNEY

C2	REF	SKILL	RAG
2.1 CHEMICAL BONDS: IONIC, COVALENT AND METALLIC	2.1.1	I can describe the three main types of bonds: ionic bonds, covalent bonds and metallic bonds in terms of electrostatic forces and the transfer or sharing of electrons	
	2.1.2	I can describe how the ions produced by elements in some groups have the electronic structure of a noble gas and explain how the charge of an ion relates to its group number	
	2.1.3	I can describe the structure of ionic compounds, including the electrostatic forces of attraction, and I can represent ionic compounds using dot and cross diagrams	
	2.1.4	I can describe covalent bonds and identify different types of covalently bonded substances, such as small molecules, large molecules and substances with giant covalent structures	
	2.1.4	I can represent covalent bonds between small molecules, repeating units of polymers and parts of giant covalent structures using diagrams, including dot and cross, ball and stick, and line diagrams	
	2.1.5	I can describe the arrangement of atoms and electrons in metallic bonds and draw diagrams the bonding in metals	
2.2 HOW BONDING AND STRUCTURE ARE RELATED TO PROPERTIES	2.2.1	I can name the three states of matter, identify them from a simple model and state which changes of state happen at melting and boiling points	
	2.2.1	I can explain changes of state using particle theory and describe factors that affect the melting and boiling point of a substance, including the strength of the forces between particles, the type of bonding and the structure of the substance	
	2.2.1	**I can discuss the limitations of particle theory**	
	2.2.3	I can explain how the structure of ionic compounds affects their properties, including melting and boiling points and conduction of electricity	
	2.2.4	I can explain how the structure of small molecules affects their properties	
	2.2.5	I can explain how the structure of polymers affects their properties	
	2.2.6	I can explain how the structure of giant covalent structures affects their properties	
	2.2.7 2.2.8	I can explain how the structure of metals and alloys affects their properties, including explaining why they are good conductors	
2.3 BONDING OF CARBON	2.3.1 2.3.2	I can explain the properties of graphite, diamond and graphene in terms of their structure and bonding	
	2.3.3	I can describe the structure of fullerenes, and their uses, including Buckminsterfullerene and carbon nanotubes	
2.4 BULK AND SURFACE PROPERTIES OF MATTER INCLUDING	2.4.1	**I can compare the dimensions of nanoparticles to other particles and explain the affect of their high surface area to volume ratio on their properties**	
	2.4.2	**I can discuss the applications of nanoparticles and their advantages and disadvantages, including uses in medicine, cosmetics, fabrics and the development of catalysts**	

KS4 TRIPLE CHEMISTRY

C3 LEARNING JOURNEY

C3	REF	SKILL	RAG
3.1 CONSERVATION OF MASS	3.1.1	I can state that mass is conserved and explain why, including describing balanced equations in terms of conservation of mass	
	3.1.2	I can describe that the relative formula mass (M_r) of a compound is the sum of the relative atomic masses of the atoms in the compound and calculate the relative formula mass of a compound, given its formula	
	3.1.2	I can calculate the relative formula masses of reactants and products to prove that mass is conserved in a balanced chemical equation	
	3.1.3	I can explain observed changes of mass during chemical reactions in non-enclosed systems using the particle model when given the balanced symbol equation	
3.2 MASSES OF SUBSTANCES	3.2.1	I can state that chemical amounts are measured in moles (mol) and explain what a mol is with reference to relative formula mass and Avogadro's constant	
	3.2.1	I can use the relative formula mass of a substance to calculate the number of moles in a given mass of the substance	
	3.2.2	I can calculate the masses of reactants and products when given a balanced symbol equation	
	3.2.3	I can use moles to write a balanced equation when given the masses of reactants and products	
	3.2.4	I can explain the effect of limiting the quantity of a reactant on the amount of products in terms of moles or masses in grams	

C3	REF	SKILL	RAG
3.3 YIELD AND ATOM ECONOMY	3.3.1	I can explain why it is not always possible to obtain the calculated or expected amount of a product, including incomplete reactions, practical losses during the experiment and competing, unwanted reactions (side reactions)	
	3.3.1	I can calculate the theoretical amount of a product from the amount of reactant and the balanced chemical equation, and I can calculate the percentage yield of a product using the equation: percentage yield = (actual yield/theoretical yield) × 100	
	3.3.2	I can describe atom economy as a measure of the amount of reactants that end up as useful products	
	3.3.2	I can calculate the percentage atom economy of a reaction to form a desired product using the equation: percentage atom economy = (relative formula mass of useful products/sum of relative formula mass of all reactants) × 100	
	3.3.2	I can explain why a particular reaction pathway is chosen to produce a specified product, given appropriate data, such as atom economy, yield, rate, equilibrium position and usefulness of by-products	
3.4 USING CONCENTRATIONS OF SOLUTIONS	3.4	I can calculate the amount of solute (in moles or grams) in a solution from it's concentration in mol/dm^3	
	3.4	I can calculate the concentration of a solution when it reacts completely with another solution of a known concentration	
	3.4	I can describe how to carry out titrations of strong acids and strong alkalis and calculate quantities in titrations involving concentrations in mol/dm3 and g/dm3	
	3.4	I can explain how the concentration of a solution in mol/dm^3 is related to the mass of the solute and the volume of the solution	
3.5 VOLUME OF GASES	3.5	I can explain that equal amounts of moles of gases occupy the same volume under the same temperature and pressure and know that the volume of one mole of any gas at room temperature (20 °C) and pressure (1 atm) is 24 dm^3	
	3.5	I can calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass, and I can calculate the volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product	

KS4 TRIPLE CHEMISTRY

C4 LEARNING JOURNEY

C4	REF	SKILL	RAG
4.1 REACTIVITY OF METALS	4.1.1	I can state that metals react with oxygen to produce metal oxides and describe this process as an oxidation reaction, which is a gain of oxygen	
	4.1.2	I can describe the arrangement of metals in the reactivity series, including carbon and hydrogen, and use the reactivity series to predict the outcome of displacement reactions	
	4.1.3	I can explain how metals can be extracted from the compounds in which they are found in nature by reduction with carbon	
	4.1.3	I can evaluate specific metal extraction processes when given appropriate information and identify which species are oxidised or reduced	
	4.1.4	I can describe oxidation as the loss of electrons and reduction as the gain of electrons	
	4.1.4	I can write ionic equations for displacement reactions, and I can identify which species are oxidised and reduced from a symbol or half equation	
4.2 REACTIONS OF ACIDS	4.2.1	I can explain in terms of gain or loss of electrons that the reactions between acids and some metals are redox reactions, and identify which species are oxidised and which are reduced	
	4.2.2	I can explain that acids can be neutralised by alkalis (soluble metal hydroxides), bases (insoluble metal hydroxides and metal oxides) and metal carbonates and list the products of each of these reactions	
	4.2.2	I can predict the salt produced in a neutralisation reaction based on the acid used and the positive ions in the base, alkali or carbonate and use the formulae of common ions to deduce the formulae of the salt	
	4.2.3	I can describe how soluble salts can be made from acids and how pure, dry samples of salts can be obtained	
	4.2.4	I can state that the pH scale is a measure of acidity and that a pH of 7 is neutral, a pH of less than 7 is acidic and a pH of greater than 7 is alkaline, and I can use a universal indicator to measure pH	
	4.2.4	I can state that acids produce hydrogen ions (H^+) in aqueous solutions and alkalis produce hydroxide ions (OH^-) and describe neutralisation reactions using the equation: $H^+ (aq) + OH^- (aq) \rightarrow H_2O (l)$	
	4.2.5	I can use and explain the terms dilute and concentrated (in terms of amount of substance) and weak and strong (in terms of the degree of ionisation) in relation to acids	
	4.2.5	I can explain how the concentration of an aqueous solution and the strength of an acid affects the pH of the solution and how pH is related to the hydrogen ion concentration of a solution	

C4	Ref	SKILL	RAG
4.3 ELECTROLYSIS	4.3.1	I can describe how ionic compounds can conduct electricity when dissolved in water and describe these solutions as electrolytes	
	4.3.1	I can describe the process of electrolysis, including how positive and negative ions are attracted to the negative electrode (cathode) and positive electrode (anode) respectively	
	4.3.2	I can describe the electrolysis of molten ionic compounds and predict the products at each electrode of the electrolysis of binary ionic compounds	
	4.3.3	I can explain how metals are extracted from molten compounds using electrolysis and use the reactivity series to explain why some metals are extracted with electrolysis instead of carbon	
	4.3.4	I can describe the electrolysis of aqueous solutions and predict the products of the electrolysis of aqueous solutions containing single ionic compounds	
	4.3.5	I can describe the reactions at the electrodes during electrolysis as oxidation and reduction reactions and write balanced half equations for these reactions	

KS4 TRIPLE CHEMISTRY

C5 LEARNING JOURNEY

C5	Ref	SKILL	RAG
5.1 EXOTHERMIC AND ENDOTHERMIC REACTIONS	5.1.1	I can describe how energy is transferred to or from the surroundings during a chemical reaction, how energy is transferred during exothermic and endothermic reactions, and some uses of exothermic and endothermic reactions	
	5.1.2	I can describe activation energy as the minimum amount of energy that particles must have to react when they collide with each other	
	5.1.2	I can interpret and draw reaction profiles of exothermic and endothermic reactions, including identifying the relative energies of reactants and products, the activation energy and the overall energy change	
	5.1.3	I can explain that breaking bonds in reactants takes an input of energy and forming bonds in the products releases energy during a chemical reaction, and I can calculate the overall energy change using bond energies	
5.2 CHEMICAL CELLS AND FUEL CELLS	5.2.1	I can describe a simple cell as two different metals in contact with an electrolyte which react to produce electricity, and a battery as two or more cells connected in series to increase voltage	
	5.2.1	I can describe why alkaline batteries are non-rechargeable and evaluate the use of cells	
	5.2.2	I can describe fuel cells and compare fuel cells to rechargeable cells and batteries	
	5.2.2	I can describe the overall reaction in a hydrogen fuel cell and write half equations for the electrode reactions	

KS4 TRIPLE CHEMISTRY

C6 LEARNING JOURNEY

C6	REF	SKILL	RAG
6.1 RATE OF REACTION	6.1.1	I can calculate the rate of a chemical reaction over time, using either the quantity of reactant used or the quantity of product formed, measured in g/s, cm^3/s or mol/s	
	6.1.1	I can draw and interpret graphs showing the quantity of product formed or reactant used up against time and use the tangent to the graph as a measure of the rate of reaction	
	6.1.1	**I can calculate the gradient of a tangent to the curve on the graph of the quantity of product formed or reactant used against time and use this as a measure of the rate of reaction at a specific time**	
	6.1.2	I can describe how factors affect the rate of a chemical reaction, including the concentration of reactants in solution, the pressure of reacting gases, the surface area of solid reactants, temperature and the presence of catalysts	
	6.1.3	I can use collision theory to explain changes in the rate of reaction, including discussing activation energy	
	6.1.4	I can describe the role of a catalyst in a chemical reaction, and I can state that enzymes are catalysts in biological systems	
	6.1.4	I can draw and interpret reaction profiles for catalysed reactions	
6.2 REVERSIBLE REACTIONS AND DYNAMIC EQUILIBRIUM	6.2.1	I can explain what a reversible reaction is, including how the direction can be changed, and represent it using symbols: $A + B \rightleftharpoons C + D$	
	6.2.2	I can explain that, for reversible reactions, if a reaction is endothermic in one direction, it is exothermic in the other direction	
	6.2.3	I can describe the state of dynamic equilibrium of a reaction as the point when the forward and reverse reactions occur at exactly the same rate	
	6.2.4	**I can explain that the position of equilibrium depends on the conditions of the reaction, and the equilibrium will change to counteract any changes to conditions**	
	6.2.5 6.2.6 6.2.7	**I can explain and predict the effect of a change in concentration of reactants or products, temperature, or pressure of gases on the equilibrium position of a reaction**	

KS4 TRIPLE CHEMISTRY

C7 LEARNING JOURNEY

C7	REF	SKILL	RAG
7.1 CARBON COMPOUNDS AS FUELS AND FEEDSTOCK	7.1.1	I can describe what crude oil is and where it comes from, including the basic composition of crude oil and the general chemical formula for the homologous series of alkanes (C_nH_{2n+2})	
	7.1.1	I can state the names of the first four members of the alkanes, and I can recognise substances as alkanes from their formulae	
	7.1.2	I can describe the process of fractional distillation and state the names and uses of fuels that are produced from crude oil by fractional distillation	
	7.1.3	I can describe trends in the properties of hydrocarbons, including boiling point, viscosity and flammability, and I can explain how their properties influence how they are used as fuels	
	7.1.3	I can describe and write balanced chemical equations for the complete combustion of hydrocarbon fuels	
	7.1.4	I can describe the process of cracking and state that the products of cracking include alkanes and alkenes, which are another type of hydrocarbon and more reactive than alkanes	
	7.1.4	**I can write balanced chemical equations for cracking, given the formulae of the reactants and products**	
7.2 REACTIONS OF ALKENES AND ALCOHOLS	7.2.1	I can state the names and draw structural formulae of the first four members of the alkenes, and I can recognise substances as alkenes from their formulae	
	7.2.1	I can describe the basic composition of alkenes, including the C=C functional group and the general chemical formula (C_nH_{2n}), and I can describe what unsaturated means in relation to alkenes	
	7.2.2	I can describe the combustion reactions of alkenes and the reactions of alkenes with hydrogen, water and halogens	
	7.2.3	I can state the functional group of alcohols and the first four members of the homologous series of alcohols, and I can represent alcohols using formulae	
	7.2.3	I can describe some properties and reactions of the first four members of alcohols, including dissolving in water, reacting with sodium, burning in air, oxidation and their use as fuels, solvents and alcoholic drinks	
	7.2.4	I can state the functional group of carboxylic acids and the first four members of the homologous series of carboxylic acids and represent them using diagrams and formulae	
	7.2.4	I can describe some properties and reactions of carboxylic acids, including dissolving in water, reacting with carbonates and reacting with alcohols	

C7	REF	SKILL	RAG
7.3 SYNTHETIC AND NATURALLY OCCURING POLYMERS	7.3.1	I can describe how alkenes can be used to make polymers by addition polymerisation	
	7.3.1	I can identify addition polymers and monomers from diagrams and from the presence of the functional group -C=C- in the monomers, and I can draw diagrams to represent the formation of an addition polymer from a given alkene monomer and vice versa	
	7.3.2	I can describe the process of condensation polymerisation	
	7.3.3	I can state that amino acids have two different functional groups in a molecule, and they react by condensation polymerisation to produce polypeptides	
	7.3.3	I can explain that different amino acids can be combined in a chain to produce proteins	
	7.3.4	I can describe DNA as a large molecule of two polymer chains made from four different monomers called nucleotides in the form of a double helix	
	7.3.4	I can state and describe some other naturally occurring polymers such as proteins, starch and cellulose	

KS4 TRIPLE CHEMISTRY

C8 LEARNING JOURNEY

C8	REF	SKILL	RAG
8.1 PURITY FORMULATIONS AND CHROMATOGRAPHY	8.1.1	I can define a pure substance and identify pure substances and mixtures from data about melting and boiling points	
	8.1.2	I can describe a formulation, and identify formulations given appropriate information	
	8.1.3	I can describe chromatography, including the terms stationary phase and mobile phase, and identify pure substances using paper chromatography	
	8.1.3	I can explain what the R^f value of a compound represents, how the Rf value differs in different solvents, and interpret and determine Rf values from chromatograms	
8.2 IDENTIFICATION OF COMMON GASES	8.2.1 8.2.2 8.2.3 8.2.4	I can explain how to test for the presence of hydrogen, oxygen, carbon dioxide and chlorine	
8.3 IDENTIFICATION OF IONS BY CHEMICAL AND SPECTROSCOPIC MEANS	8.3.1	I can identify some metal ions from the results of flame tests and describe how to conduct a flame test, including which metal ions can be identified using flame tests and what happens if a sample contains a mixture of ions	
	8.3.2	I can describe how sodium hydroxide solution can be used to identify some metal ions, and I can identify metal ions from the results of their reactions with sodium hydroxide solution	
	8.3.2	I can write balanced equations for the reactions between sodium hydroxide solution and some metal ions to produce insoluble hydroxides	
	8.3.3	I can describe how to identify carbonates using limewater	
	8.3.4, 8.3.5	I can describe how to identify negative ions, including halide ions using silver nitrate and sulfate ions using barium chloride	
	8.3.6	I can state the advantages of using instrumental methods to identify elements and compounds compared to chemical tests	
	8.3.7	I can describe how to use flame emission spectroscopy to identify metal ions and interpret the results of a flame emission spectroscopy test	

KS4 TRIPLE CHEMISTRY

C9 LEARNING JOURNEY

C9	Ref	SKILL	RAG
9.1 COMPOSITION AND EVOLUTION OF EARTH'S ATMOSPHERE	9.1.1	I can describe the makeup of Earth's atmosphere using percentages, fractions or ratios, including nitrogen, oxygen and other gases, such as carbon dioxide, water vapour and noble gases	
	9.1.2	I can describe how early intense volcanic activity may have helped form the early atmosphere and water vapour that condensed to form oceans, including the build up of nitrogen from the volcanoes	
	9.1.3	I can explain how, at the beginning of Earth's existence, oxygen was produced by photosynthesis and use the word and chemical equation for photosynthesis	
	9.1.3	I can state the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level	
	9.1.4	I can explain ways that atmospheric carbon dioxide levels decreased, including photosynthesis, the formation of sedimentary rocks and the creation of crude oil from the remains of plankton	
9.2 CARBON DIOXIDE AND METHANE AS GREENHOUSE GASES	9.2.1	I can name some greenhouse gases and describe how they cause an increase in Earth's temperature	
	9.2.2	I can list some human activities that produce greenhouse gases	
	9.2.2	I can evaluate arguments for and against the idea that human activities cause a rise in temperature that results in global climate change	
	9.2.3	I can state some potential side effects of global climate change, including discussing scale, risk and environmental implications	
	9.2.4	I can define a carbon footprint as the total amount of carbon dioxide and other greenhouse gases emitted over the life cycle of a product, service or event and list some actions that could reduce the carbon footprint	
9.3 COMMON POLLUTANTS	9.3.1	I can describe the combustion of fuels as a major source of atmospheric pollutants and name the different gases that are released when a fuel is burned	
	9.3.2	I can describe the properties and effects of carbon monoxide, sulfer dioxide and particulates in the atmosphere	

KS4 TRIPLE CHEMISTRY

C10 LEARNING JOURNEY

C10	REF	SKILL	RAG
10.1 USING EARTH'S RESOURCES AND OBTAINING POTABLE WATER	10.1.1	I can give some examples of natural resources and describe how they are used by humans	
	10.1.1	I can explain that Earth's resources are finite, and they are processed to provide energy and materials for consumption, and I can give examples of finite and renewable resources	
	10.1.1	I can explain what sustainable development is and discuss the role chemistry plays in sustainable development, including improving agricultural and industrial processes	
	10.1.2	I can discuss the importance of water quality for human life, including defining potable (drinkable) water	
	10.1.2	I can describe methods to produce potable water, including desalination of salty water or sea water and the potential problems of desalination	
	10.1.3	I can describe waste water as a product of urban lifestyles and industrial processes that includes organic matter, harmful microbes and harmful chemicals	
	10.1.3	I can describe the process of sewage treatment and compare the ease of obtaining potable water from waste water as opposed to ground or salt water	
	10.1.4	I can name and describe alternative biological methods for extracting metals, including phytomining and bioleaching	
	10.1.4	I can evaluate alternative methods for extracting metals	
10.2 LIFE CYCLE ASSESSMENT AND RECYCLING	10.2.1	I can describe, carry out and interpret a simple comparative LCA of materials or products	
	10.2.1	I can discuss the advantages and disadvantages of LCAs, including the difficulty in quantifying pollutant effects and the misuse or misinterpretation of abbreviated LCAs	
	10.2.2	I can discuss how to reduce the consumption of raw resources by reducing use, reusing, and recycling products and explain how reusing and recycling reduces energy use	

C10	REF	SKILL	RAG
10.3 USING MATERIALS	10.3.1	I can define corrosion and describe rusting as an example of corrosion which requires air and water	
	10.3.1	I can describe ways to prevent corrosion, including providing coatings and sacrificial protection	
	10.3.2	I can name some alloys and their uses and describe the benefits of using alloys instead of pure metals	
	10.3.3	I can compare the properties of materials, including glass and clay ceramics, polymers and composites, and explain how their properties are related to their uses	
	10.3.3	I can discuss the different types of polymers and how their composition affects their properties, including thermosoftening polymers	
	10.3.3	I can explain that composites are made from two or more materials, including a matrix and reinforcement, and provide examples of composites and their benefits over other types of materials	
10.4 HABER PROCESS AND USE OF NPK FERTILISERS	10.4.1	I can describe the Haber process, including the reactants and products, recycling of remaining hydrogen and nitrogen, and the chemical equation	
	10.4.1	I can apply the principles of dynamic equilibrium to the Haber process and discuss the trade-off between the rate of production and the position of equilibrium and explain how this impacts the commercial use of the Haber process	
	10.4.2	I can describe NPK fertilisers and the compounds they are composed of, and compare the industrial production of fertilisers with the laboratory preparations, given appropriate information	