



KS3 Progression Grid - Chemistry



	STRAND 1 Atoms, elements & compounds/the particulate nature of matter	STRAND 2 Pure and Impure substances and materials	STRAND 3 Chemical reaction and energetics	STRAND 4 The periodic table & patterns of reactivity	STRAND 5 Earth and atmosphere	STRAND 6 Working scientifically
9	All the below and... • can explain quantities like Ar, Mr and moles of substance. • knows terms such as relative atomic mass and the C scale. • knows what an icon is and can work out the electronic configuration of simple anions and cations.	All the below and... • can suggest how the rate of diffusion may be affected. • can suggest some applications for making substances impure. • can describe properties of some 'smart materials' & suggest uses for such materials based on their properties.	All the below and... • can suggest methods that may be used to extract metals more reactive than carbon. • can explain that during chemical reactions, energy may be released or absorbed during the making and breaking of bonds.	All the below and... • can explain the patterns of reactivity for Group 1 and Group 7 in the periodic table, in terms of atomic structure and the ease of electron transfer.	All the below and... • can explain the carbon cycle and how life and the oceans have altered the Earth's atmosphere from its original composition. • can suggest ways that the level of carbon dioxide in the atmosphere can be reduced.	All the below and... • can explain and use the terms accuracy, precision, repeatability, reproducibility, range, interval and bias correctly and in any context. • can use data to support or refute an argument or stated position.
8	All the below and... • can explain how pressure in gases may change with changing volume and temperature. • can draw accurate diagrams of electron structure of atoms and of particular elements using the periodic table. • can explain the law of conservation of mass in chemical reactions and changes of state.	All the below and... • can explain how simple techniques for separating mixtures work. • can describe dissolving, with reference to particles. • can identify pure and impure substances from data. • can explain diffusion happens in terms of the particle model.	All the below and... • can recognise and explain neutralisation, combustion, thermal decomposition, oxidation, displacement and reaction of metals and acids, as examples of chemical reactions. • can explain the differences in properties of different materials, such as metals, diamond, graphite and sodium chloride with reference to their structure.	All the below and... • can explain how metals and non-metals react with water using word-equations. • can explain some of the properties of metals and non-metals with reference and structure. • can describe how metal oxides react with water to form an alkaline solution and non-metal oxides react with water to form acidic solutions. • can describe the patterns of reactivity for Group 1 and Group 7 in the periodic table.	All the below and... • can explain the production of carbon dioxide by human activity and its impact on the climate. • can name some of the molecules that contain carbon on the Earth and in its atmosphere.	All the below and... • can present reasoned explanations, including explaining data in relation to predictions and hypotheses.
7	All the below and... • can describe how pressure occurs in gases. • knows the composition of atoms of particular elements in terms of the number of protons, neutrons and electrons using the periodic table.	All the below and... • can explain how mixtures from elements and compounds. • can describe how to carry out simple techniques for separating mixtures. • can describe diffusion in terms of the particle model.	All the below and... • can represent chemical reactions using balanced symbol equations. • can explain changes of state with reference to the energy levels of particles. • can describe neutralization, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids as examples of chemical reactions. • Can describe how using catalysts, increasing temperature, increasing concentrations or increasing surface area will affect reaction rate, with reference to particles & collisions.	All the below and... • can describe the work of Mendeleev and others in the development of the modern periodic table. • can state that metal and non-metal oxides react differently with water.	All the below and... • can explain how the three different types of rocks are formed, and describe, explain and compare the appearance of different rock types including crystal size and grain shapes. • can describe how the atmosphere has altered over geological time. • can discuss the importance of recycling.	All the below and... • understands and used IUPAC chemical nomenclature. • can identify further questions arising from the results of an investigation. • can apply sampling techniques.
6	All the below and... • can explain changes of states with reference to energy levels of particles. • can identify the relative masses and charges of subatomic particles. • can label the subatomic particles of a simple atomic model. • can recognise and understand more complicated polyatomic chemical formulae including H_2SO_4, CuSO_4, CaCO_3, Ca(OH)_2.	All the below and... • can describe a mixture, including dissolved substances. • can select appropriate simple techniques for separating given mixtures like solutions and insoluble solids from liquids. • can describe how impurities may affect boiling and melting points of impure substances. • can describe some properties of different materials such as ceramics, polymers and composites. • can suggest uses for different materials based on their properties.	All the below and... • can represent chemical reactions using symbol equations which do not need balancing. • can describe simple displacement reactions from the order of metals and carbon in the reactivity series. • can state that during chemical reactions, energy may be absorbed or released resulting in characteristic temperature changes. • can describe changes of states with reference to energy changes. • can describe ways to speed up chemical reactions, such as increase temperature, increase concentrations or increase surface area and catalysts.	All the below and... • can state that elements in the same group of periodic table will have similar patterns in reactions. • can name some groups of the periodic table including alkali metals, halogens and noble gases. • can describe how properties of metals and non-metals make them suitable for different uses. • can identify transition elements from their position in the periodic table.	All the below and... • can suggest ways that the level of carbon dioxide in the atmosphere can be reduced. • can describe the formation of rocks and explain the rock cycle. • can suggest ways to reduce the amount of raw materials we use. • can explain the impact of human activities on the climate by producing carbon dioxide.	All the below and... • can evaluate data showing awareness of potential sources of random and systematic error. • can undertake basic data analysis including simple statistical techniques. • can recognise anomalous results in data. • can calculate mean data while recognising the need to exclude anomalous results from mean calculations.

5	All the below and... • can describe the differences between atoms, elements and compounds. • can describe atoms using Dalton's simple model. • can recognise a simple nuclear atomic model. • knows that mass is conserved during changes of state and chemical reactions. • can recognise and understand simple chemical formulae including H₂O, CH₄, NH₃, CO₂.	All the below and... • can describe what a pure substance is. • can recognise the differences between a mixture and pure substances. • can identify and use simple techniques for separating mixtures such as filtration, evaporation, distillation and chromatography. • can state that different materials have different properties.	All the below and... • can state that during changes of state, there are energy changes. • can describe that during chemical reactions, surroundings may increase or decrease in temperature. • can state neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids, as examples of chemical reactions. • can represent chemical reactions using word equations. • knows the typical acidic reactions with metals, alkalis and carbonates to form salts.	All the below and... • can state that the modern periodic table was developed by Mendeleev with contributions by other. • can state that the periodic table can be used to predict patterns in reactions. • can identify where metals and non-metals can be found on the periodic table. • can state that the periodic table is arranged in periods and groups. • can describe how elements with similar physical and chemical properties are grouped together. • can list properties of metals & non-metals.	All the below and... • can describe how the three different types of rocks are formed. • can name the main elements that make up the Earth's core and crust. • can describe the carbon cycle in simple terms.	All the below and... • can make and record observations and measurements using a range of methods for different investigations. • can comment the reliability of methods. • can suggest possible improvements to an investigative technique. • can suggest possible improvements to an investigative technique. • can work out appropriate axes & scales for graphs. • can draw best-fit lines for appropriate data. • knows that scientific theories develop as earlier explanations are modified to take into account new evidence. • understands the importance of publishing results and peer review.
4	All the below and... • can represent the three states of matter with diagrams of the arrangement particles. • knows the differences between atoms, elements and compounds. • can describe how particles may move through a fluid by diffusion. • can describe the arrangement and motion particles in the three states of matter.	All the below and... • knows that mixtures may be separated by filtering, sieving and evaporating.	All the below and... • knows that an indicator may be used to determine if a substance is acidic or alkaline. • can apply the pH scale to test substances. • knows that different acids and alkalis may have different strengths. • knows that some substances are more reactive than others. • knows that during chemicals reactions reactants become products by rearranging the particles taking part in a reaction. • knows that reactants have different properties to the products they make in a reaction.	All the below and... • can define an element as a substance that cannot be split into simpler substances. • can state that all elements currently known may be found listed in the periodic table. • can understand that elements have their own chemical symbol. • can represent elements using chemical symbols. • can recall the chemical symbols of commonly found elements including Na, Cl, O, Fe, Cu N.	All the below and... • can describe ways that human activities impact on climate by producing carbon dioxide. • can name the three different types of rocks, igneous, sedimentary and metamorphic. • can describe some of the problems that might arise from using the Earth's limited/finite resources. • can name the main elements and compounds that make up the Earth's atmosphere and describe its composition in terms of percentages. • can state that carbon is present in different forms on the Earth and its atmosphere. • can list human activities that influence the climate such as burning fossil fuels.	All the below and... • can use simple equations to carry out calculations from results and interpret observations to identify simple patterns. • can ask questions based on observations and make simple predictions. • can plan a simple investigation and identify independent, dependent and control variables. • can recognise some potential sources of error.
3	All the below and... • can name the three states of matter. • can describe the properties of the three states of matter. • can name the changes of states.	All the below and... • can compare and group together everyday materials. • knows that some materials dissolve to form solutions. • know and can use key words such as soluble, insoluble, solute, solvent and dissolve and solution.	All the below and... • knows that dissolving, mixing and changes of state are reversible changes. • knows some changes are irreversible like burning and the action of vinegar on bicarbonate of soda.	All the below and... • understands that materials may be grouped according to their properties such as hardness, solubility, transparency, conductivity and response to magnets.	All the below and... • can name some resources that humans use from the Earth. • can state that the Earth's resources finite. • can identify the Earth's crust, mantle, outer core and inner core.	All the below and... • can name and use some SI units. • can name some common chemicals such as water, hydrochloric acid, sodium chloride. • can identify hazards and carry out a simple risk assessment. • can identify simple patterns or trends from data presented in graphs.
2	All the below and... • can compare and group materials according to whether they are solid, liquid or gases.	All the below and... • can observe that some materials change state when they are heated or cooled.	All the below and... • can find out how the shapes of solids objects made from some materials can be changed by squashing, twisting, bending and stretching.	All the below and... • can identify and name everyday materials including wood, plastic, glass, metal, water and rock.	All the below and... • knows that there are different types of rocks. • can state that humans use the Earth as a source of resources.	All the below and... • can present finding and draw simple conclusions from experimental data. • can present observations and data using simple tables and graphs where axes and scales are provided.
1	Can... • know that different materials have different properties.	Can... • recognise the difference between a pure substance and a mixture.	Can... • describe the simple physical properties of a variety of everyday materials.	Can... • distinguish between an object and the material from which it is made.	Can... • understand that the Earth is one of the planets in the Solar System. • know how day and night lengths changes with the seasons.	Can... • take measurements using a range of scientific equipment, including repeat readings. • draw simple, correctly-labelled scientific diagrams. • follow instructions safely.