

Subject	Chemistry	Year Group:	7		
Unit/Topic	Particles and their Behaviour	Elements, Atoms, Compounds	Reactions	Acids and Alkalis	
Skills	AF1 – Thinking scientifically. Practical skills gained in ‘How does the volume of water affect the time taken to reach boiling?’ Potential crossover with ‘Thermal energy and temperature’ in the Energy module of Physics.	AF4 – Using investigative approaches. Research project to investigate metals, their properties and uses. Explain choices in equipment/ information sources. Making repeat measurements/ observations. Assessing risk.	AF4 – Using investigative approaches - . Identify control variables. Select equipment or information sources from those provided to address a question or idea under investigation e. Make some accurate observations or whole number measurements relevant to questions or ideas under investigation. Recognise obvious risks when prompted.	AF4 – Using investigative approaches -. Identify control variables. Select equipment or information sources from those provided to address a question or idea under investigation e. Make some accurate observations or whole number measurements relevant to questions or ideas under investigation. Recognise obvious risks when prompted.	
Knowledge	The properties of materials can be explained by their particles, specifically their motion, arrangement and energy. A substance is solid below its melting point and liquid below boiling point (but above melting point) and a gas above the boiling point.	Knowledge of properties of elements and exceptions/ oddities. Using ideas of states of matter to deduce or explain the state of a material at room temperature. Reactions of metals with oxygen and acids. Reactivity series. Describing physical or chemical change using scientific terminology.	During a chemical reaction, bonds are broken (requires energy) and new bonds are formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the opposite is true, the reaction is endothermic.	The difference between an acid and alkali and what the pH scale is. Understanding what an indicator is and how it is used in science. Mixing an acid and an alkali produces a chemical reaction, neutralisation, which forms a chemical called a salt and water.	

Recall/review from previous learning	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 • Be able to compare and group materials together based on whether they are a solid, liquid or a gas. • Observe that materials can change state when either heated or cooled. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 • Making comparisons. • Using keywords to describe the properties of materials; such as hardness, solubility, transparency, conductivity and response to magnets. • Describing the uses of materials specific to their properties.	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 • Distinguish between an object and the material it is made from. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials based on their simple physical properties.	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 • Naming acids and alkalis • Identifying hazards
Assessment	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.

Cultural Capital	To be able to describe and explain changes in the world around us including the states of water eg, ice, liquid water and steam/ vapour, which may also relate to weather. Link to condensation after boiling the kettle/ taking a shower. How chocolate melts in the mouth.	Being able to classify materials around us as an atom, element or compound	Identify chemical reactions used in every day life Links to chemical industry – companies that produce household products such as Unilever and Johnson and Johnson.	Classifying everyday materials such as orange juice or bleach as acids or alkalis. What acids and alkalis are used for.
Literacy/Numeracy	Literacy – extended writing assessments, describe and explain work. Numeracy – interpreting graphs is a major component. Taking measurements of temperature. Taking repeat measurements. Calculating means.	Literacy – extended writing assessments e.g. big write, describe and explain work, spelling tests Numeracy – exploring data, constructing graphs and calculating means.	Literacy – extended writing assessments e.g. big write, describe and explain work, spelling tests Numeracy – interpreting graphs, reading a scale, taking measurements, plotting results.	Literacy – extended writing assessments e.g. big write, describe and explain work, spelling tests Numeracy – interpreting graphs, reading a scale, taking measurements, plotting results.

Subject	Chemistry	Year Group:	8		
Unit/Topic	Periodic table	Metals and materials	The Earth	Separation Techniques	
Skills	AF1 – Thinking scientifically. Describing the properties of different substances. Explaining the properties of different substances.	AF4 – Using investigative approaches. Research project to investigate metals, their properties and uses. Explain choices in equipment/information sources. Making repeat measurements/observations. Assessing risk.	AF1 – Thinking Scientifically Literacy and interpretation skills of recycling and global warming. Making observations from experiments and describing the results.	AF4 – Using investigative approaches – using a Bunsen burner to crystallisation, doing basic filtration using a funnel and learning how to use basic laboratory equipment safely. How to carry out a risk assessment.	
Knowledge	Naming elements and compounds Structure of an atom Naming elements in group 1 and 7, describing elements and reactivity and explaining their reactivity. Describing polymers	Knowledge of properties of elements and exceptions/ oddities. Using ideas of states of matter to deduce or explain the state of a material at room temperature. Reactions of metals with oxygen and acids. Reactivity series. Describing physical or chemical change using scientific terminology.	Knowledge of the structure of the earth and different types of rock. Identifying and describing different stages in the rock cycle. Describing the earth's resources and how humans use them including recycling of materials. Why do humans use metals and how are metals extracted. What are greenhouse gases, how are they produced and what is their effect on the atmosphere.	Knowledge of how to tell if a substance is soluble or insoluble. The difference between a hazard and a risk. Understanding the difference between a solute, solvent and solution.	

Recall/review from previous learning	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 Identify and compare different everyday materials. Give reasons, based on evidence from tests, for the uses of everyday objects. From Yr 7: Describing substances (Particles and Separating Solutions topics). Describing chemical reactions (Chemical reactions topic).	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 Making comparisons. Using keywords to describe the properties of materials; such as hardness, solubility, transparency, conductivity and response to magnets. Describing the uses of materials specific to their properties. Explaining new materials can be formed from reactions of burning and the action of acid.	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 Compare and group together different types of rock. Formation of fossils Know that rocks and soils are made from organic matter. From Yr 7: Describing the different properties of substances (Separating Solutions) From Yr 8: Properties of metals (Periodic table).	1-5 recall starters (recall from previous lessons) Lessons building on from KS2 Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution •Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating •Demonstrate that dissolving, mixing and changes of state are reversible changes
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Assessment	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.	Formative assessment – end of topic tests. (Pupil receives percentage, step and band taken for data analysis) Summative Interleaving Assessments In class questioning Literacy – extended writing tasks. Self and peer assessment.
Cultural Capital	Everything is made up of atoms and elements. Use of chemical symbols and formula instead of names of elements/compounds to communicate with scientists across the world. 'Job of the lesson' promoted each lesson.	The ability to accurately describe the properties of materials and predict what will happen during reactions, for example the reaction of metals and acids can link to pollution and erosion by acid rain. Reactions of metals and oxygen can link to rusting.	Extraction of metals – uses of particular metals in everyday life and how extraction of metals impacts the environment. Importance and need to recycle materials. What is global warming and how does human activity contribute to global warming. 'Job of the lesson' promoted each lesson.	Being able to classify materials around us (air, water, milk) as either pure or a mixture. How we can separate mixtures in industry – e.g. oil, water treatment.
Literacy/Numeracy	Literacy – extended writing assessments, describe and explain work and a Big Write. Numeracy – interpreting graphs Two spelling tests of key words per topic.	Literacy – the big write extended writing. Numeracy – exploring data, constructing graphs and calculating means.	Literacy – interpreting information about recycling in the Skills lesson and information about global warming and a Big Write. Numeracy – interpreting graphs and identifying trends. Two spelling tests of key words per topic.	Literacy – extended writing assessments e.g. big write, describe and explain work, spelling tests Numeracy – interpreting graphs, taking measurements, plotting results.

Subject	Chemistry	Year Group:	9		
Unit/Topic	Particle model and state change	Atomic structure and the periodic table	Chemical changes	Useful chemical reactions	
Skills	AF4 – using investigative approaches Practical skills – using thermometers and investigating melting / boiling points. Math skills – calculating and interpreting data from graphs and investigations.	AF5 – working critically with evidence Practical skills – separation techniques. And reactivity of elements Research skills – development of the atom and why reactivity changes within groups.	AF3 – communicating and collaborating in science. Practical skills – investigating conservation of mass and energy changes in a chemical reactions. Reading equipment e.g. thermometer or stopwatch Maths skills – interpreting graphs and tables with data. Calculating energy changes from experimental data	AF1 – thinking scientifically Practical skills – reactivity of elements in different groups and displacement reactions and extracting metals. Research skills – metals ores and their uses. Maths skills – calculating yields and relative mass calculations.	
Knowledge	Use of the particle model Substances and states of matter Sublimation and changes of state Limitations of the particle model	Atomic structure (proton, neutron, electrons) Ions (cover more in year 10) and isotopes How the periodic table has developed How the electronic structure links with reactivity Properties of alkali metals, halogens and why Noble gases are unreactive.	Chemical and Physical changes Chemical equations Conservation of mass Energy in chemical reactions Definitions of exothermic and endothermic.	Chemical reactions Using metals The reactivity series Displacement reactions Extracting metals Catalysts Relative mass Calculating yields	
Recall/review from previous learning	Knowledge from previous work on simple states of matter and investigating particles and from year 7 and 8.	Knowledge from previous work on atoms and periodic table from year 7 and 8.	Knowledge from previous learning on reactants/products and recognising if simple reactions have occurred from year 7 and 8	Knowledge from previous learning on metals and their reactivity from year 7 and 8	

Assessment	Formative assessment (end of topic tests) Questioning during class Extended writing and literacy activities. Both peer and self-assessment Summative interleaving assessment.	Formative assessment (end of topic tests) Questioning during class Extended writing and literacy activities. Both peer and self-assessment . summative interleaving assessment.	Formative assessment (end of topic tests) Questioning during class Extended writing and literacy activities Both peer and self-assessment. Summative interleaving assessment.	Formative assessment (end of topic tests) Questioning during class Extended writing literacy activities. Both peer and self-assessment interleaving assessment.
Cultural Capital	Understanding how energy links to particles and an objects property. Job of the lesson promoted at the beginning of a lesson. Cross curricular – DT (resistant materials), DT (Food)	Everything is made up of atoms and elements. Use of balanced symbol equations to communicate with scientists across the world. ‘The principles underpinning the Mendeleev Periodic table and how the current periodic table came to be. How the reactivity of elements in the same group can be predicted by looking at the periodic table Job of the lesson’ promoted each lesson. Cross curricular – English, History,	Most things involve chemical reactions and this involves transfer of energy and the mass of reactants and products stays the same. Cross curricular – DT (food), DT (resistant materials) ,	Understanding of need for a compromise between yield and rate in industry and about resources like metals running out and why this is problematic. Cross curricular – DT(resistant materials), Geography, computing, Maths

Literacy/Numeracy	Literacy – Extended writing assessments, describe and explain work. Numeracy – Interpreting graphs and collecting data to analyse.	Literacy - Extended writing comparing reaction questions Numeracy – balancing equations, interpreting graphs - to identify how atomic mass links to boiling and melting point/	Literacy - Extended writing including describing analysis and explaining. Numeracy – weighing and using various scales and converting units	Literacy -Extended writing comparing the reactivity of various metal elements and how they can link to use and quantity of resources. Numeracy – calculating relative mass values and calculating yields from investigations.
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Subject	Chemistry	Year Group:	10	
Unit/Topic	Chemical Changes	Structure and Bonding	Electrolysis	
Skills	Mixing of reagents to explore chemical changes and/or products	Learning how to represent different types of bonding e.g., using dot and cross diagrams.	Higher only – write half equations for electrolysis. Measuring of solutions and using a power pack safely to conduct electrolysis. Interpreting results.	
Knowledge	Acids are neutralised by alkalis and bases. Salt solutions by reacting solid insoluble substances with acids. Salt solutions can be crystallised to produce solid salts. A strong acid completely ionises in water whereas a weak acid only partially ionises in water.	Describe the process of melting, freezing, boiling and condensing. Explain, in terms of particles, the energy and temperature of a substance when it is at the melting point or boiling point. Use the particle model to describe how energy, movement, and attraction between particles change as a substance is heated or cooled. Describe, with an example of each, ionic, simple covalent, giant covalent and metallic bonding. Draw dot and cross diagrams for ionic and covalent bonding.	When an ionic compound is melted or dissolved in water, the ions are free to move. When an ionic compound is a solid, the ions aren't free to move. Passing an electric current through electrolytes causes the ions to move to electrodes. Positive ions move to the negative electrode, negative ions move to the positive electrodes. Aluminium is extracted from aluminium oxide using electrolysis as aluminium is more reactive than carbon. This process requires cryolite to reduce the melting point of aluminium oxide and the positive electrode need to be continually replaced.	
Recall/review from previous learning	1-5 recall starters pH of acids and alkalis. Naming of acids and salts.	1-5 recall starters. Electronic structure (y9)	1-5 recall starters Definition of an ion (y9) Ionic bonding (structure and bonding)	

Assessment	End of topic test	End of topic test	End of topic test
Cultural Capital	Having a greater understanding of how household cleaning chemicals work.	Linking the properties of familiar substances (such as graphite in a pencil or diamond) to bonding and structure.	How metals are extracted for use in everyday products such as mobile phones or jewellery.
Literacy/Numeracy	Reading an instructional method to do a practical. Reading off measurements	Counting numbers of electrons and numbers of bonds.	Descriptions of what happens at each electrode, measuring solutions.

Subject	Chemistry	Year Group:	10	
Unit/Topic	Chemical Calculations			
Skills	Recognise and use: expressions in decimal form, standard form, significant figures. Change the subject of an equation. Understanding and being able to manipulate ratios.			
Knowledge	Definition of relative formula mass, moles, understanding how Avogadro's constant is linked to moles, calculating empirical formula.			
Recall/review from previous learning	1-5 recall starters. Basic SI units (grams, seconds, ml) from KS3			
Assessment	End of topic test			
Cultural Capital	Skills that are taught in this topic relate to real life concepts such as changing ratios for a recipe.			
Literacy/Numeracy	Converting between different units. See skills.			

Subject	Chemistry	Year Group:	11	
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Unit/Topic	Hydrocarbons	Chemical analysis	The Earths atmosphere
Skills	WS 1.2	WS 2.2, 4.1, 1.4, 3.1, 2.3	WS 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 3.5, 3.6, 4.1
Knowledge	- Crude oil is a mixture of hydrocarbons - Crude oil is a finite resource - Recognise formula and structure of (alkanes and alkenes) - Fractional distillation - Properties of hydrocarbons (viscosity, boiling point, flammability) - Cracking	- Pure substances and formulations - Chromatography - Testing for gases	- Early and evolving atmosphere - Present day composition of atmosphere - Greenhouse gases and Greenhouse effect - global warming evidence - Carbon footprint and atmospheric pollution
Recall/review from previous learning	Y9 Covalent bonding Y7 Energy in fuels	Y7 Separating mixtures	Y8 Earth Topic – Greenhouse gases
Assessment	Mid-topic assessment SAM learning Science End of topic test Mock exam In-class questioning In-class exam Q and self-assessing	Mid topic assessment SAM learning science Seneca learning End of topic test Mock exam Teacher questioning Required practical – testing for ions	Mid-topic assessment SAM learning science End of topic test Mock exam Questioning In-class AfL
Cultural Capital	Awareness of supply 'v' demand for fuels. Suitability for different hydrocarbons for specific purposes. Environmental impact of burning hydrocarbons.	Formulations specially designed for a purpose Importance of testing food colourings for safety	Effect of human actions on climate change. Examining data of carbon footprint form different countries. Reducing carbon footprint is a worldwide problem.
Literacy/Numeracy	Terminology of naming homologous series Calculating formula of alkanes from structure Balancing equations for cracking of hydrocarbons	MS 1a, 1c, 1d, 2a	Key terms: naming gases in atmopshere and greenhouse gases Graphs of temperature change Graphs of carbon dioxide levels Internation carbon footprint data MS 1c

Subject	Chemistry	Year Group:	11	
Unit/Topic	The Earths resources			
Skills	WS 1.3, 4, 5, 3.2 Required prac 13			
Knowledge	Finite and renewable resources			

	Recycling Potable water Treating waste water Ores Life Cycle Assessments Recycling		
Recall/review from previous learning	Y8 Earth topic – resources and recycling		
Assessment	Mid-topic assessment, SAM learning, end of topic test, questioning, AfL within lesson. Required practical 13		
Cultural Capital	Appreciation that not all countries have fresh water sources so must obtain clean water by desalination of sea water.		
Literacy/Numeracy	MS 1a, 1c, 1d, 2a, 2c, 4a, 2h Key terms: finite, potable, desalination, Life cycle assessment		

Subject	A-level Chemistry	Year Group:	12	
Unit/Topic	Inorganic	Organic		Physical
Skills	Use and application of scientific methods and practices	Independent thinking Use and application of scientific methods and practices Instruments and equipment		Independent thinking Use and application of scientific methods and practices Numeracy and the application of mathematical concepts in a practical context Instruments and equipment

Knowledge	Periodicity Group 2 Group 7	Introduction to Organic Alkanes Halogenoalkanes Alkenes Alcohols Organic analysis	Atomic structure Amount of substance Bonding Energetics Kinetics Chemical equilibria, Le Chatelier's principle, K _c Oxidation, reduction and redox equations
Recall/review from previous learning	KS4: Atomic structure and the periodic table KS4: Chemical analysis	KS4: Organic chemistry KS4: Chemical analysis	KS4: Atomic structure and the periodic table KS4: Bonding, structure and properties of matter KS4: Energy changes KS4: Quantitative chemistry KS4: The rate and extent of chemical change
Assessment	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks
Cultural Capital	Job link each lesson University course links University visits National Field work week British science week	Job link each lesson University course links University visits National Field work week British science week	Job link each lesson University course links University visits National Field work week British science week
Literacy/Numeracy	Handling data	Handling data Graphs	Arithmetic and numerical computation Handling data Algebra Graphs Geometry and trigonometry

Subject	A-level Chemistry	Year Group:	13	
Unit/Topic	Inorganic	Organic	Physical	
Skills	Independent thinking Use and application of scientific methods and practices Numeracy and the application of mathematical concepts in a practical context Instruments and equipment	Independent thinking Use and application of scientific methods and practices Instruments and equipment	Independent thinking Use and application of scientific methods and practices Numeracy and the application of mathematical concepts in a practical context Instruments and equipment	
Knowledge	Properties of period 3 elements and their oxides Transition metals Reactions of ions in aqueous solution	Optical isomerism Aldehydes and ketones Carboxylic acids and derivatives Aromatic chemistry Amines Polymers Amino acids, proteins and DNA Organic synthesis Nuclear magnetic resonance spectroscopy Chromatography	Thermodynamics Rate equations Equilibrium constant K_p , for homogenous systems Electrode potentials Acids and bases	
Recall/review from previous learning	KS4: Atomic structure and the periodic table KS4: Chemical analysis KS5: Inorganic (Y12)	KS4: Organic chemistry KS4: Chemical analysis KS5: Organic (Y12)	KS4: Atomic structure and the periodic table KS4: Bonding, structure and properties of matter KS4: Energy changes KS4: Quantitative chemistry KS4: The rate and extent of chemical change KS4: Chemical changes KS5: Physical (Y12)	
Assessment	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks	Formative assessments – end of topic tests Summative assessments – mock exams In class questioning Exam question homework tasks	

Cultural Capital	Job link each lesson University course links University visits National Field work week British science week	Job link each lesson University course links University visits National Field work week British science week	Job link each lesson University course links University visits National Field work week British science week
Literacy/Numeracy	Arithmetic and numerical computation	Arithmetic and numerical computation	Arithmetic and numerical computation
	Handling data Algebra Graphs	Handling data Graphs	Handling data Algebra Graphs