Year 10 Themes	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
	Students will know that					
Structure and bonding **Chemical Calculations** **Chemical Changes** **Electrolysis** **Chemical Changes** **Rates and equilibrium**	Ionic bonding occurs between metals and non-metals, forming giant ionic lattices with high melting points. Covalent bonding occurs between non-metals, forming simple molecules or giant covalent lattices (diamond, graphite, silicon dioxide). Metallic bonding involves delocalised electrons and explains properties of metals. Nanoparticles have large SA:V ratios and unusual properties. States of matter are explained by particle models, and changes of state occur at fixed temperatures.	Mass is conserved in chemical reactions. Chemical equations can be balanced to show reacting amounts. The mole is a fixed number of particles (Avogadro). Relative formula mass and moles link mass and number of particles. Concentrations can be expressed in mol/dm³. Percentage yield and atom economy measure efficiency of reactions. Titrations allow calculation of concentrations.	Metals can be arranged in a reactivity series based on their reactions with water, acids, and displacement reactions. Ionic half equations show electron transfer in oxidation and reduction. Acids react with bases to form salts, and with carbonates to form carbon dioxide. The pH scale measures acidity/alkalinity in terms of H^+ ion concentration.	Electrolysis decomposes ionic compounds using electricity; products depend on ion reactivity. The extraction of metals depends on their position in the reactivity series (e.g., carbon reduction, electrolysis). There are real-world applications of these processes in industry, sustainability, and resource management.	Chemical reactions transfer energy. Exothermic reactions release energy; endothermic reactions absorb energy. Reaction profiles show energy changes. Bond energies can be used to calculate energy changes. Cells and batteries use chemical reactions to produce electricity; fuel cells use hydrogen in a sustainable way.	Rates of reaction depend on temperature, concentration, pressure, surface area and catalysts. Collision theory explains rates. Reversible reactions reach equilibrium, where forward and backward rates are equal. Le Chatelier's principle predicts equilibrium shifts. The Haber process and industrial processes rely on equilibrium and optimisation.
	Students will know how to					
	Draw ionic, covalent and metallic bonding diagrams. Explain properties of substances from bonding; describe and evaluate uses of	Balance equations. Calculate relative formula mass, moles, masses and concentrations. Carry out titrations (separate science).	Write balanced symbol equations for reactions of acids and metals, bases, and carbonates. Investigate the reactivity of metals through practical experiments.	Predict products of electrolysis for molten salts and aqueous solutions. Write ionic half equations for electrode reactions.	Measure temperature change in reactions. Draw reaction profiles. Calculate bond energy changes.	Investigate rates (disappearing cross/gas volume); analyse graphs; apply Le Chatelier's principle.

polymers, graphene and nanoparticles. Understand the different command words used in 6-mark GCSE questions.	Evaluate atom economy and yield. Answer exam question calculations	Construct and interpret reactivity series from experimental results. Use the pH scale and universal indicator/ pH probes to determine acidity. Perform neutralisation titrations and calculate concentrations. Be confident in answering four-mark GCSE questions.	Apply knowledge to industrial contexts (e.g., extraction of aluminium, purification of copper).		
Vocabulary and the concepts they link to					
Ionic, covalent, metallic, lattice, intermolecular forces, delocalised → links to physics (forces, energy).	*Mole, Avogadro, concentration, yield, atom economy, limiting reactant* → strong maths links.	*Oxidation, reduction, displacement, reactivity, pH.*	*Electrolysis, anode, cathode, ion, electron, extraction, ore.*	*Exothermic, endothermic, activation energy, bond enthalpy, fuel cell* → physics (energy).	*Rate, collision theory, catalyst, equilibrium, Le Chatelier's principle* → maths (graphs, ratios).
Assessment					
End-of-topic test; exam-style questions.	End-of-topic test; RP: titration.	End-of-topic test; RP reactivity of metals	End-of-topic test; RP electrolysis	End-of-topic test; RP: temperature change.	End-of-topic test; RP: rates of reaction.
Diversity & development of cultural capital					
Applications in nanotechnology, materials science, and medicine.	Green chemistry and sustainability (reducing waste).	Industry career links	Ethical issues around mining metals	Global energy challenges; development of green technologies.	Economics vs environmental factors
Cross-curricular opportunities and enrichment					

	Maths (ratios, geometry); physics (forces); STEM careers.	Maths (proportionality, rearranging equations);		Physics (electricity in electrolysis) Geogaphy (sustainability of mining)	Physics crossover; sustainability debates.	Maths (gradient); business (industry).

Year 11 Themes	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
Rates and equilibrium Crude oils and fuels Polymers Chemical Analysis The Earth's resources Using resources	**Students will know that**					
	Rates of reaction depend on temperature, concentration, pressure, surface area and catalysts. Collision theory explains rates. Reversible reactions reach equilibrium, where forward and backward rates are equal. Le Chatelier's principle predicts equilibrium shifts. The Haber process and industrial processes rely on equilibrium and optimisation.	Crude oil is a finite resource, separated by fractional distillation. Hydrocarbons (alkanes) are saturated; alkenes are unsaturated and reactive. Alcohols, carboxylic acids and esters have important uses. Cracking breaks large hydrocarbons into smaller molecules. Polymers are made by addition and condensation reactions.	Pure substances have sharp melting/boiling points; formulations are useful mixtures. Chromatography separates mixtures and calculates Rf values. Tests identify common gases (O_2, CO_2, H_2, Cl_2). Flame tests and precipitation reactions identify ions. Instrumental methods (e.g. mass spectrometry, IR) are rapid and accurate.	Earth's early atmosphere was mostly CO_2, volcanic gases and little oxygen. Photosynthesis increased O_2 and decreased CO_2. Greenhouse gases trap heat and contribute to climate change. Human activity (fossil fuels, deforestation) increases greenhouse gases. Pollutants (SO_2, NO_x, particulates) cause acid rain and health issues.	Earth's resources can be finite or renewable. Potable water must be treated. Life-cycle assessments compare environmental impact. Recycling reduces use of finite resources. Chemistry contributes to sustainable development.	Core concepts revisited across all topics. Required practicals revised and applied. Exam techniques practised.
	Students will know how to					
	Investigate rates (disappearing cross/gas volume); analyse graphs; apply Le Chatelier's principle.	Draw structures of hydrocarbons; describe fractional distillation and cracking; explain polymerisation; test alkenes.	Carry out chromatography; perform flame/ion tests; interpret chromatograms and spectra.	Explain atmospheric changes over time; analyse climate data; evaluate environmental impacts.	Investigate water purification; carry out LCAs; evaluate recycling strategies.	Apply practical and calculation skills; tackle extended questions; use command words effectively.
	Vocabulary and the concepts they link to					
	Rate, collision theory, catalyst, equilibrium, Le Chatelier's	*Hydrocarbon, alkane, alkene, polymer,*	*Chromatography, formulation, Rf value, flame test, precipitate*	*Greenhouse gas, climate change, pollutant,*		All key vocabulary revisited & reinforced.

	principle → maths (graphs, ratios).	*monomer, functional group* → biology (lipids, proteins).	→ *physics (spectroscopy).*	*carbon footprint* → geography & biology.	*Finite, renewable, potable, recycling, LCA* → geography	
	Assessment					
	End-of-topic test; RP: rates of reaction.	End-of-topic test.	End-of-topic test; RP: chromatography, gas tests.	End-of-topic test.	End-of-topic test; RP: water purification.	Mock exams; practice papers; RP focus.
	Diversity & development of cultural capital					
	Economics vs environmental factors	Environmental issues of plastics and fossil fuels.	Forensics, medicines, food safety.	Climate change awareness; global responsibility for environment.	Global inequalities in access to clean water and resources.	
	Cross-curricular opportunities and enrichment					
	Maths (gradient); business (industry).	Geography (pollution and sustainability)	Careers in forensics, pharma, food chemistry.	Geography (climate)	Geography (resources); sustainability projects.	Cross-topic revision workshops; intervention; peer mentoring.