LEARNING PLAN AND TOPIC CHECKLIST

GCSE Chemistry

Foundation and Higher | Combined and separate science

A subject-by-subject learning plan for Year 11 students taking AQA, Pearson Edexcel or Cambridge OCR GCSE Science (9-1). It brings the shared content, Higher demand and separate-science extensions into one teaching checklist.

A complete topic framework, selected for each child

15 teaching units and 105 coverage entries. This is a union of the listed routes: a child follows the rows relevant to their school qualification, rather than every extension automatically.

Qualifications covered

Board / suite	Separate Chemistry	Combined Science
AQA	8462	8464 Trilogy / 8465 Synergy
Pearson Edexcel	1CH0	1SC0
OCR Gateway A	J248	J250
OCR Twenty First Century B	J258	J260

Both Foundation and Higher are covered. Separate sciences are often called triple science. This plan covers England GCSE routes; International GCSE, A-level and other awarding organisations need a separate specification check.

What is included

Subject knowledge • Applied calculations • Working scientifically • Required/core practical and PAG preparation • Board-specific differences • Evidence of progress

How we use this learning plan

This is the full topic coverage map for a Year 11 GCSE revision programme. Weekly lessons prioritise diagnosed gaps, school deadlines and exam practice. Topics are revisited rather than treated as complete after one explanation.

Record the correct student route first

Record	What staff need
Student and group	Full name, tutor, group slot, starting assessment and individual support needs.
Qualification	Exam board, exact specification code and Combined or separate science route.
Evidence of progress	Topic ID, date taught, independent practice, assessment evidence, misconception and next action.

A suggested 60-minute lesson

Minutes	Learning activity
0-5	Retrieval questions and a short check of prior learning.
5-20	Teach or revisit one focused objective with a worked example.
20-40	Guided practice with active checks and corrections.
40-55	Independent exam-style application, matched to board and tier.
55-60	Exit question, feedback and clear homework or revision action.

Track competence, not just attendance

Use the blank tracking box beside each objective: N = not yet taught; T = taught; P = practising; S = secure independently. Record evidence in the group learning record. Revisit an S judgement if later retrieval shows a gap.

Suggested review cycle: baseline assessment; focused teaching blocks; a short mixed assessment after each block; correction and re-teaching; then timed papers with a question-level gap review. The exact order and pace are set for the group.

At the end of each week, send attendance, actual teaching time, content covered and private individual concerns to Asad Patel or Aman. They issue the parent update and arrange resources through the community or private channels.

Choosing the right content

Teach the relevant shared content together, with matched Foundation, Higher and separate-science tasks. Triple science means three separate GCSEs; Combined Science is a different qualification, not a tier. Mixed groups do not make every row examinable for every child.

Tag	How to use it
F/H	Shared Foundation and Higher teaching. Match the wording, examples and depth to the named board; Higher students also need extension and application.
H	Higher-tier extension; use it for the Higher routes that specify it.
S	Additional separate-science content; it is not automatically required for Combined Science. Foundation/Higher depth may differ.
S-H	Separate science at Higher depth.
R or a combined tag	Route-dependent content or a tier boundary that varies. The row or board notes identify the variation; the official specification resolves the precise requirement.
☐ tracking box	Enter N/T/P/S for not yet taught / taught / practising / independently secure, with dated evidence in the learning record.

Board differences that matter

AQA

Use sections 4.1-4.10 in 8462; Trilogy chemistry uses 5.1-5.10. Separate extensions include titration, yield/atom economy, cells, advanced organic chemistry, ion analysis, materials and industrial fertiliser production.

Pearson Edexcel

Use topics 1-9; Separate Chemistry 1 and 2 are topics 5 and 9. Include quantitative analysis, industrial ammonia/fertilisers and the alcohol-combustion practical for separate students. Do not assume AQA cracking/alkene scope equals Edexcel Combined scope.

OCR

Gateway uses C1-C6 and practical skills. Twenty First Century uses C1-C6 plus Ideas about Science and practical skills, with air/water and material-choice contexts. Quantitative, analytical and industrial depth must follow the student route.

Unit map

C01 Particles, states of matter and atomic structure • C02 The periodic table and chemical patterns • C03 Bonding, structure and properties of materials • C04 Formulae, equations and quantitative chemistry • C05 Acids, alkalis, neutralisation and salts • C06 Metals, redox, extraction and corrosion • C07 Electrolysis and ionic change • C08 Energy changes, chemical cells and fuels • C09 Reaction rates, reversibility and equilibrium • C10 Crude oil, hydrocarbons and fuels • C11 Organic reactions, polymers and biological molecules • C12 Separation, purity and chemical analysis • C13 The atmosphere, climate and air quality • C14 Water, finite resources and sustainability • C15 Industrial chemistry and fertilisers

C01 Particles, states of matter and atomic structure

SPECIFICATION LOCATORS | AQA 4.1-4.2; Edexcel 1-2; OCR Gateway C1; OCR Twenty First Century C2.1 and C4.3

ID / route	Teaching focus and coverage	Track
C01.01 **F/H**	**Particle model** Compare solids, liquids and gases using particle arrangement, movement, spacing and energy; explain changes of state and limitations of the simple model.	☐
C01.02 **F/H**	**Atoms, elements and compounds** Distinguish atoms, elements, compounds and mixtures; interpret chemical symbols, formulae and particle diagrams.	☐
C01.03 **F/H**	**Subatomic particles** Use proton, neutron and electron charges/masses; calculate particle numbers using atomic number and mass number for atoms and simple ions.	☐
C01.04 **F/H**	**Isotopes and relative mass** Explain isotopes and relative atomic mass; calculate weighted means from isotope abundances where specified.	☐
C01.05 **F/H**	**Models of the atom** Explain how evidence changed atomic models, including electron discovery, alpha scattering and the nuclear model.	☐
C01.06 **F/H**	**Electronic structure** Represent electron arrangements for the first twenty elements and relevant ions; connect outer electrons with group placement and reactivity.	☐

C02 The periodic table and chemical patterns

SPECIFICATION LOCATORS | AQA 4.1; Edexcel 1 and 6; OCR Gateway C4.1; OCR Twenty First Century C2

ID / route	Teaching focus and coverage	Track
C02.01 **F/H**	**Organisation of the table** Use groups, periods and atomic number; connect electronic structure with chemical properties and metallic/non-metallic character.	☐
C02.02 **F/H**	**Development of the periodic table** Explain early ordering and Mendeleev predictions, and why later atomic-number evidence improved the model.	☐
C02.03 **F/H**	**Group 1** Describe alkali-metal properties and reactions with oxygen, water and halogens; explain reactivity trends using outer electrons.	☐
C02.04 **F/H**	**Group 7** Describe halogen properties, displacement reactions and reactivity trends; predict products and interpret observations.	☐
C02.05 **F/H**	**Group 0** Explain noble-gas stability and trends in physical properties; connect uses with inertness and density or boiling point.	☐
C02.06 **S**	**Transition metals** Compare transition metals with Group 1; include coloured compounds, variable ions and catalysis where required.	☐

C03 Bonding, structure and properties of materials

SPECIFICATION LOCATORS | AQA 4.2; Edexcel 1 and 9; OCR Gateway C2.2-2.3; OCR Twenty First Century C2.3, C3.1 and C4

ID / route	Teaching focus and coverage	Track
C03.01 **F/H**	**Ionic bonding** Explain electron transfer, ion formation and electrostatic attraction; draw dot-and-cross representations and derive ionic formulae.	☐
C03.02 **F/H**	**Ionic structures** Relate giant ionic lattices to high melting points and electrical conduction when molten or dissolved; distinguish ions from molecules.	☐
C03.03 **F/H**	**Covalent bonding** Explain shared electron pairs and represent simple molecules with diagrams; relate molecular properties to forces between molecules.	☐
C03.04 **F/H**	**Giant covalent structures** Compare diamond, graphite and silicon dioxide; explain hardness, melting behaviour and conductivity from bonding and structure.	☐
C03.05 **F/H**	**Metallic bonding** Explain positive metal ions and delocalised electrons; link metal structure with conductivity, malleability and alloy properties.	☐
C03.06 **R**	**Carbon materials** Explain properties and uses of graphene, fullerenes and nanotubes; exact depth and Combined/separate placement differ by board.	☐
C03.07 **F/H**	**Structure-property reasoning** Distinguish bonds within a substance from intermolecular forces; compare molecular, ionic, metallic and giant covalent substances.	☐
C03.08 **S/R**	**Nanoscience** Use nanoparticle size ranges and surface-area-to-volume ideas; evaluate applications, benefits and uncertainties at the board-required route and tier.	☐

C04 Formulae, equations and quantitative chemistry

SPECIFICATION LOCATORS | AQA 4.1 and 4.3; Edexcel 1, 5 and 9; OCR Gateway C3.1 and C6.1; OCR Twenty First Century C2.4 and C5.3-5.4

ID / route	Teaching focus and coverage	Track
C04.01 **F/H**	**Names and formulae** Write symbols and formulae of familiar elements, compounds and ions; interpret formula ratios and correctly name common salts.	☐
C04.02 **F/H**	**Chemical equations** Write word and balanced symbol equations, using state symbols when required; distinguish coefficients from subscripts.	☐
C04.03 **F/H**	**Conservation of mass** Explain apparent mass changes in open systems; calculate missing masses and relate balanced equations to conservation of atoms.	☐
C04.04 **F/H**	**Relative formula mass** Calculate relative formula/molecular mass and percentage composition using relative atomic masses.	☐
C04.05 **R**	**Empirical and molecular formulae** Derive formulae from experimental masses or percentage composition, and relate empirical to molecular formulae where required, including Edexcel quantitative content.	☐
C04.06 **F/H**	**Mass relationships** Use reacting-mass ratios and experimental data at Foundation depth; distinguish measured quantities from calculated theoretical values.	☐
C04.07 **H/R**	**Moles and reacting quantities** Use amount = mass / molar mass, Avogadro particle-number relationships and balanced equations; calculate reacting masses and identify limiting reactants at the specified tier.	☐
C04.08 **F/H**	**Mass concentration** Calculate concentrations in g/dm^3; convert between cm^3 and dm^3; interpret dilution and concentration data.	☐
C04.09 **S-H/R**	**Molar concentration and gas volume** Calculate mol/dm^3 concentrations, titration amounts and gas volumes using stated molar volumes where the route requires these extensions.	☐
C04.10 **S**	**Yield and atom economy** Calculate percentage yield and atom economy; explain losses and compare reaction routes using efficiency, waste, cost and usefulness of products.	☐

C05 Acids, alkalis, neutralisation and salts

SPECIFICATION LOCATORS | AQA 4.4; Edexcel 3; OCR Gateway C3.3; OCR Twenty First Century C5.4 and C6.1

ID / route	Teaching focus and coverage	Track
C05.01 **F/H**	**Acids, bases and indicators** Explain acids, bases and alkalis; use indicator colours and the pH scale to compare acidic, neutral and alkaline solutions.	☐
C05.02 **F/H**	**Acid reactions** Predict and write equations for reactions with metals, metal oxides/hydroxides and carbonates; identify salts and gas products.	☐
C05.03 **F/H**	**Salt preparation** Choose a suitable acid and reactant; describe excess-solid addition, filtration, evaporation/crystallisation, drying and purity considerations.	☐
C05.04 **F/H**	**Neutralisation** Explain neutralisation in terms of acid/base reactions; use acid and alkali ions at the depth required by the selected route.	☐
C05.05 **H**	**Strong, weak and concentrated** Distinguish acid strength from concentration, explain ionisation and relate pH changes to hydrogen-ion concentration.	☐
C05.06 **S/R**	**Solubility and precipitation** Use solubility information to choose reagents, predict precipitates and prepare insoluble salts; include ionic equations where specified.	☐
C05.07 **S**	**Titration technique** Use a burette, pipette and suitable indicator to obtain concordant titres; explain rinsing, endpoint, repeats and accuracy.	☐
C05.08 **S-H/R**	**Titration calculations** Use balanced equations and measured volumes to calculate an unknown concentration where this is part of the route-specific Higher content.	☐

C06 Metals, redox, extraction and corrosion

SPECIFICATION LOCATORS | AQA 4.4 and 4.10; Edexcel 4-5; OCR Gateway C3.3, C4.1 and C6.1; OCR Twenty First Century C3.2 and C6.4

ID / route	Teaching focus and coverage	Track
C06.01 **F/H**	**Reactivity series** Compare reactions with water, dilute acids and oxygen; place metals with carbon and hydrogen in a reactivity series.	☐
C06.02 **F/H**	**Displacement** Predict displacement reactions and explain them using relative reactivity; connect observations with equations.	☐
C06.03 **F/H**	**Oxidation and reduction** Describe redox using oxygen transfer; identify oxidised and reduced substances in extraction or displacement reactions.	☐
C06.04 **H**	**Electron-transfer redox** Explain oxidation as electron loss and reduction as electron gain; write and balance appropriate ionic half-equations.	☐
C06.05 **F/H**	**Extracting metals** Choose carbon reduction or electrolysis using reactivity; explain ore concentration and environmental/economic considerations.	☐
C06.06 **H**	**Alternative extraction** Evaluate phytomining and bioleaching, including advantages, limitations and recovery of the metal from resulting compounds.	☐
C06.07 **S**	**Corrosion and protection** Explain rusting conditions, barrier methods, galvanising and sacrificial protection using evidence about metal reactivity.	☐
C06.08 **S/R**	**Electroplating** Explain electroplating to change appearance or corrosion resistance, including the specified Edexcel separate-Chemistry application.	☐
C06.09 **S**	**Alloys and material choice** Relate composition and structure of useful alloys to properties; evaluate material selection from supplied data.	☐

C07 Electrolysis and ionic change

SPECIFICATION LOCATORS | AQA 4.4; Edexcel 3; OCR Gateway C3.4; OCR Twenty First Century C3.3

ID / route	Teaching focus and coverage	Track
C07.01 **F/H**	**Electrolytes and apparatus** Explain why molten/dissolved ionic substances conduct; identify anode, cathode, positive/negative ions and power supply.	☐
C07.02 **F/H**	**Molten compounds** Predict products of molten electrolysis and describe ion movement, electron transfer and decomposition.	☐
C07.03 **F/H**	**Aqueous products** Predict products of aqueous electrolysis using the required selection rules; explain competition between water-derived and dissolved ions.	☐
C07.04 **F/H**	**Aluminium extraction** Explain electrolysis of aluminium oxide in cryolite, the energy requirement and replacement of carbon anodes.	☐
C07.05 **H**	**Half-equations** Write electrode half-equations, check charge balance and connect electrode reactions with oxidation and reduction.	☐
C07.06 **R**	**Copper electrolysis** Interpret experiments with inert and copper electrodes and changes in electrode mass or solution; include copper purification where specified.	☐

C08 Energy changes, chemical cells and fuels

SPECIFICATION LOCATORS | AQA 4.5; Edexcel 5, 7 and 9; OCR Gateway C3.2; OCR Twenty First Century C1.2 and C6.4

ID / route	Teaching focus and coverage	Track
C08.01 **F/H**	**Exothermic and endothermic reactions** Identify energy transfer direction and temperature changes; give examples and explain practical uses.	☐
C08.02 **F/H**	**Reaction profiles** Draw and interpret profiles showing reactants, products, overall energy change and activation energy.	☐
C08.03 **F/H**	**Measuring energy changes** Plan temperature-change experiments, identify controls and explain heat loss, insulation and comparison of conditions.	☐
C08.04 **H**	**Bond-energy calculations** Explain energy required to break bonds and released when bonds form; calculate overall energy changes from bond-energy data.	☐
C08.05 **S**	**Chemical cells and batteries** Explain how reactants and electrolytes affect cell output; distinguish rechargeable and non-rechargeable batteries.	☐
C08.06 **S**	**Hydrogen fuel cells** Explain fuel-cell reactions and evaluate hydrogen as an energy carrier against other fuels or batteries.	☐
C08.07 **S/R**	**Combustion calorimetry** Interpret alcohol-fuel calorimetry and calculations using a stated specific heat capacity; evaluate incomplete combustion and energy losses.	☐

C09 Reaction rates, reversibility and equilibrium

SPECIFICATION LOCATORS | AQA 4.6; Edexcel 4 and 7; OCR Gateway C5; OCR Twenty First Century C6.2-6.3

ID / route	Teaching focus and coverage	Track
C09.01 **F/H**	**Measuring rate** Calculate mean rate using a change in mass, volume or concentration over time; interpret reaction progress graphs.	☐
C09.02 **H**	**Instantaneous rate** Use tangents and gradients to compare rates at a particular moment where required; distinguish this from an average rate.	☐
C09.03 **F/H**	**Collision theory** Explain effects of concentration, gas pressure, surface area and temperature using collisions and activation energy.	☐
C09.04 **F/H**	**Catalysts** Explain catalytic pathways and their effect on rate without using up the catalyst; connect catalyst choice with industrial or environmental applications.	☐
C09.05 **F/H**	**Rate investigations** Compare gas-collection, mass-loss and colour/cloudiness methods; identify control variables, endpoints, repeats and appropriate graphs.	☐
C09.06 **F/H**	**Reversible reactions** Use reversible arrows; describe opposing changes and their energy transfers with suitable examples.	☐
C09.07 **F/H**	**Dynamic equilibrium** Explain equilibrium in a closed system as equal forward and reverse rates, with constant concentrations rather than equal amounts.	☐
C09.08 **H**	**Changing equilibrium** Predict effects of concentration, pressure and temperature; explain why catalysts change speed of reaching equilibrium rather than equilibrium position.	☐

C10 Crude oil, hydrocarbons and fuels

SPECIFICATION LOCATORS | AQA 4.7; Edexcel 8; OCR Gateway C6.2; OCR Twenty First Century C3.4

ID / route	Teaching focus and coverage	Track
C10.01 **F/H**	**Crude oil and alkanes** Describe crude oil as a mixture; interpret hydrocarbon formulae and alkane homologous-series patterns.	☐
C10.02 **F/H**	**Fractional distillation** Explain separation by boiling range, the temperature gradient and condensation; relate fractions to chain length and uses.	☐
C10.03 **F/H**	**Hydrocarbon properties** Compare boiling point, viscosity, volatility and flammability as molecular size increases; connect properties with fuel uses.	☐
C10.04 **F/H**	**Combustion and pollution** Write combustion equations at the route-required depth; compare complete and incomplete combustion and explain carbon monoxide, soot and other pollutants.	☐
C10.05 **R**	**Cracking and alkenes** Explain cracking and its economic purpose; recognise unsaturation and the bromine-water test. AQA Trilogy includes this; Edexcel locates much of this work in Separate Chemistry 2.	☐
C10.06 **S/R**	**Fuel choices** Evaluate alternative and renewable fuels using production, transport, energy output, air pollution and carbon-impact evidence.	☐

C11 Organic reactions, polymers and biological molecules

SPECIFICATION LOCATORS | AQA 4.7; Edexcel 9; OCR Gateway C6.2; OCR Twenty First Century C3.4 and C4.2

ID / route	Teaching focus and coverage	Track
C11.01 **S**	**Organic structures and naming** Name and represent relevant alkenes, alcohols and carboxylic acids; use displayed/structural formulae and homologous-series patterns.	☐
C11.02 **S**	**Alkene reactions** Explain addition reactions with hydrogen, halogens or water where required; draw products from double-bond structures.	☐
C11.03 **S**	**Alcohols and acids** Describe alcohol combustion, oxidation and fermentation; explain carboxylic-acid reactions, weak acidity and ester formation where specified.	☐
C11.04 **S**	**Addition polymers** Relate monomer structures to repeat units and polymers; explain polymer properties and environmental issues.	☐
C11.05 **S-H/R**	**Condensation polymers** Relate functional groups, monomers, links and small-molecule products in condensation polymerisation, at the board-required depth.	☐
C11.06 **S-H/R**	**Naturally occurring polymers** Explain the GCSE chemistry of amino acids/proteins, sugars/starch/cellulose and DNA where the board includes these, including the relevant Higher-tier restrictions.	☐
C11.07 **S/R**	**Polymer choice and disposal** Evaluate thermosoftening/thermosetting materials where specified, recycling, biodegradation and limitations of alternative materials.	☐

C12 Separation, purity and chemical analysis

SPECIFICATION LOCATORS | AQA 4.1 and 4.8; Edexcel 2 and 9; OCR Gateway C2.1 and C4.2; OCR Twenty First Century C5.1-5.2

ID / route	Teaching focus and coverage	Track
C12.01 **F/H**	**Purity and formulations** Distinguish pure substances, mixtures and formulations; interpret melting/boiling behaviour and explain why formulations are designed for a purpose.	☐
C12.02 **F/H**	**Separation techniques** Select filtration, crystallisation, evaporation, simple distillation, fractional distillation or chromatography for a mixture; explain the physical basis.	☐
C12.03 **F/H**	**Chromatography** Interpret chromatograms, distinguish mixtures, calculate Rf values and explain the importance of the solvent and stationary phase.	☐
C12.04 **F/H**	**Gas tests** Describe the required tests for hydrogen, oxygen, carbon dioxide and chlorine, including positive observations and safe practice.	☐
C12.05 **S**	**Cation identification** Use Li/Na/K/Ca/Cu flame tests and required hydroxide precipitates, including Al, Ca, Mg, Cu and Fe ions; test ammonium where specified and interpret observations.	☐
C12.06 **S**	**Anion identification** Test carbonate with acid, sulfate with barium reagent after acidification, and halides with acidified silver nitrate; explain observations and required reagent order.	☐
C12.07 **S**	**Instrumental analysis** Explain the usefulness of sensitive, rapid instrumental techniques and interpret flame-emission spectra or other supplied results where specified.	☐
C12.08 **S/R**	**Unknown-sample reasoning** Choose a sequence of tests to identify unknowns; justify conclusions using evidence rather than a single ambiguous observation.	☐

C13 The atmosphere, climate and air quality

SPECIFICATION LOCATORS | AQA 4.9; Edexcel 8; OCR Gateway C6.3; OCR Twenty First Century C1.1-1.3

ID / route	Teaching focus and coverage	Track
C13.01 **F/H**	**Atmosphere composition and history** Describe current air composition and explain how geological, ocean and biological processes changed the early atmosphere.	☐
C13.02 **F/H**	**Greenhouse effect** Explain absorption and emission of radiation by greenhouse gases and distinguish the greenhouse effect from ozone depletion.	☐
C13.03 **F/H**	**Climate evidence** Interpret trends in carbon dioxide, methane, temperature and fossil-fuel use; evaluate evidence, uncertainty and human influences.	☐
C13.04 **F/H**	**Climate impacts and mitigation** Explain possible consequences of warming; evaluate emission reduction, carbon-footprint choices and practical limitations.	☐
C13.05 **F/H**	**Air pollutants** Explain sources and effects of carbon monoxide, sulfur dioxide, nitrogen oxides and particulates; compare prevention and treatment strategies.	☐

C14 Water, finite resources and sustainability

SPECIFICATION LOCATORS | AQA 4.10; Edexcel 8-9; OCR Gateway C6.1 and C6.3; OCR Twenty First Century C1.4 and C4.5

ID / route	Teaching focus and coverage	Track
C14.01 **F/H**	**Potable and pure water** Distinguish safe drinking water from chemically pure water; explain testing for dissolved solids and interpreting water-quality evidence.	☐
C14.02 **F/H**	**Water treatment** Compare freshwater treatment, filtration, sterilisation and desalination; explain distillation, membranes and energy/cost considerations where specified.	☐
C14.03 **F/H**	**Wastewater treatment** Describe sewage-treatment stages and removal of harmful material; distinguish domestic, agricultural and industrial contamination.	☐
C14.04 **F/H**	**Resources and recycling** Distinguish finite from renewable resources; compare extraction, reuse and recycling using energy, economic and environmental evidence.	☐
C14.05 **F/H**	**Life-cycle assessment** Compare raw-material extraction, manufacture, use and disposal; interpret life-cycle data and evaluate uncertainty or value judgements.	☐
C14.06 **S**	**Materials and uses** Compare metals, glass, ceramics, polymers and composites; explain why a material or combination of materials suits a use.	☐

C15 Industrial chemistry and fertilisers

SPECIFICATION LOCATORS | AQA 4.10; Edexcel 5; OCR Gateway C6.1; OCR Twenty First Century C6.4

ID / route	Teaching focus and coverage	Track
C15.01 **S**	**The Haber process** Describe sources of hydrogen/nitrogen, the reversible ammonia reaction and the roles of catalyst, temperature and pressure.	☐
C15.02 **S-H**	**Industrial compromises** Explain trade-offs between equilibrium yield, rate, costs, energy and safety; interpret industrial-condition data.	☐
C15.03 **S**	**Fertilisers** Explain why nitrogen, phosphorus and potassium compounds are needed; compare laboratory preparation with integrated industrial production.	☐
C15.04 **S/R**	**Industrial scale and process design** Compare laboratory and industrial production; explain separation, recycling of unreacted feedstock, raw-material supply and control of conditions for required industrial examples.	☐
C15.05 **S**	**Choosing production routes** Use yield, atom economy, raw-material availability, by-products, energy, waste and market demand to evaluate a manufacturing route.	☐

Practical knowledge and investigations

Online tuition develops understanding of methods, variables, apparatus, data and evaluation. Watching a demonstration or discussing results does not certify that a pupil has completed the hands-on work required through their school or exam centre.

RP = AQA required practical; CP = Edexcel core practical; PAG = OCR practical activity group. AQA numbers below refer to the separate subject specification; Combined practicals may use different numbering. For Synergy, use its own practical list.

Investigation focus	Official route pointer / teaching connection
Preparing a pure dry soluble salt	AQA RP1; Edexcel CP3.17; OCR preparative techniques
Accurate acid-alkali titration	AQA RP2 (separate); Edexcel CP5.9C (separate); OCR quantitative techniques
Electrolysis and electrode products	AQA RP3; Edexcel CP3.31; OCR electrolysis techniques
Temperature changes in reactions	AQA RP4; OCR energy investigations; Edexcel relevant reaction-energy work
Rates: gas collection and disappearing cross	AQA RP5; Edexcel CP7.1; OCR rate investigations
Paper chromatography / separating inks	AQA RP6; Edexcel CP2.11 also includes simple distillation; OCR separation work
Tests for ions and unknown salts	AQA RP7 (separate); Edexcel CP9.6C (separate); OCR analysis work
Water analysis, purification and distillation	AQA RP8; OCR/Edexcel relevant water and separation work
pH during neutralisation	Edexcel CP3.6; useful comparative investigation for other routes
Comparing combustion of alcohol fuels	Edexcel CP9.28C (separate); useful calorimetry comparison where relevant

For every relevant investigation, students should be able to:

- State a testable question or prediction and choose independent, dependent and control variables.
- Select apparatus, ranges, intervals, controls, repeats and appropriate safety precautions; explain why the method measures the intended quantity.
- Record readings with units and sensible precision; use tables, means, rates, graphs and calculations appropriate to the subject.
- Identify anomalies and random/systematic errors; distinguish accuracy, precision, repeatability and reproducibility; propose specific improvements.
- Draw a conclusion supported by results, discuss uncertainty and avoid claiming causation or certainty beyond the evidence.

OCR permits suitable activities that collectively cover the prescribed apparatus and techniques. A familiar experiment is not a substitute for checking the actual PAG/skills requirements.

Skills, assessment and progression

Mathematical skills across the plan

- Use ratios, fractions, percentages, means, significant figures, standard form and appropriate unit/prefix conversions.
- Rearrange and substitute into relevant equations; state units; show working and assess whether an answer is physically or biologically reasonable.
- Plot suitable scales, interpret tables and graphs, recognise proportionality and calculate gradients, areas or rates where the tier requires them.
- Interpret uncertainty, ranges, experimental repeats and numerical evidence when evaluating an investigation or claim.

Scientific reasoning and communication

Explain models and their limitations; distinguish a prediction, observation and explanation; use evidence and peer review to evaluate claims. Practise clear definitions, application to unfamiliar contexts, multi-step calculations and extended responses using correct scientific vocabulary.

How progress is checked

Stage	Evidence
Baseline	A short assessment covering key prior knowledge, calculations and one practical/data question.
During teaching	Retrieval, questioning, worked-example completion and independent application to each selected topic.
Review	A mixed test and analysis of incorrect answers; re-teach the misconception and check again.
Exam preparation	Correct board, qualification and tier papers; timed practice, practical/data questions and targeted follow-up.

What parents will see

Weekly updates summarise the topics covered, practice or resources, next steps and any child-specific concerns. Shared community posts contain general learning content; individual progress and personal concerns are sent privately.

Official sources and specification checks

Research checked on 27 October 2026. Links open the awarding organisation or Department for Education source. The plans paraphrase and organise content for Hikmah teaching; they are not exam-board publications or endorsements.

The national topic framework is based on Department for Education content, © Crown copyright 2013/2015, reused under the Open Government Licence v3.0. Exam-board documents are linked for their own wording, route boundaries and assessment requirements.

01 DfE Separate

GCSE subject content for biology, chemistry and physics

02 DfE Combined

GCSE subject content for combined science

03 AQA Chemistry

Chemistry 8462 - specification, version 1.2, January 2026

04 AQA Trilogy

Combined Science Trilogy 8464 - specification, version 1.3, October 2026

05 AQA Synergy

Combined Science Synergy 8465 - specification, version 1.4, October 2026

06 Edexcel Chemistry

Chemistry 1CH0 - specification, issue 4, March 2024

07 Edexcel Combined

Combined Science 1SC0 - specification, issue 6, March 2024

08 OCR Chemistry A

Gateway Chemistry A J248 - current specification

09 OCR Chemistry B

Twenty First Century Chemistry B J258 - specification, version 4.0, August 2026

10 OCR Combined A

Gateway Combined Science A J250 - specification, version 5.0, May 2026

11 OCR Combined B

Twenty First Century Combined Science B J260 - specification, version 5.0, June 2026

12 OCR Practicals

GCSE science practical activities and practical activity groups (PAGs)

Before setting each assignment

Confirm the school entry code, tier and current specification. Select only relevant checklist rows and the correct paper/practical requirements. Recheck board updates before the examination series; provided formula or equation sheets do not remove the need to interpret and use equations.