# Chemistry – Key Stage 4

**AQA Chemistry 8462**

https://www.aqa.org.uk/subjects/science/gcse/chemistry-8462

| | What pupils will learn | How it builds on learning |
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| Year 10 | **Bonding, structure and the properties of matter**<br>Chemical bonds, ionic bonding, ionic compounds, covalent bonding, metallic bonding, states of matter, properties of ionic compounds, properties of small molecules, polymers, giant covalent structures, properties of metals and alloys, structure and bonding of carbon, bulk and surface properties of matter including nanoparticles.<br>*Foundation tier*<br>*Students do not explore the limitations of the particle model* | Foundational content is covered in this unit, which needs to be covered with Atomic structure unit before other units are introduced. Separating mixtures not covered here as this is covered in chemical analysis. Builds on material covered in a variety of units at KS3. |
| | **Atomic Structure and the periodic table**<br>Atoms, elements and compounds; mixtures; development of the model of the atom; charges of subatomic particles; size and mass of atoms; relative atomic mass; electronic structure; development of periodic table; metals and non-metal; properties of group 0, 1 and 7; properties of transition metals.<br>*Foundation tier*<br>*Students do not have to write balanced half and ionic equations* | Foundational content is covered in this unit, which needs to be covered with Bonding unit before other units are introduced. Builds on material covered in a variety of units at KS3. |
| | **Chemical analysis**<br>Pure substances, formulations, chromatography, tests of common gases, identification of ions by chemical and spectroscopic means. | Builds on ideas covered in year 8 - separating mixtures. These ideas include separating mixtures, chromatography and gas tests. |
| | **Quantitative Chemistry**<br>Conservation of mass and balancing equations, relative formula mass, chemical measurements, moles and balancing equations, limiting reactants, concentration of solutions, percentage yield, atom economy, calculations based on chemical equations, gas volumes.<br>*Foundation tier*<br>*Students do not study moles , the amounts of substances in equations or balancing equations using moles*<br>Students do not study using concentrations of solutions in mol/dm$^3$ | Introduced in year 10 as there are opportunities in year 11 to revisit the ideas covered here. Concepts within this unit are challenging, and students tend to grasp the ideas better when exposed to them twice. |
| | **Using resources**<br>Using the Earth's resources and sustainable development, potable water, waste water treatment, alternative methods for extracting metals, life cycle assessment, reducing resource use, corrosion and its prevention, alloys, ceramics, polymers and | Builds on ideas covered in year 9 in materials unit and also allows revisiting of concepts from year 10 Bonding and Atomic Structure units – these include potable water, types of material, life cycle assessments. |

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| | composites, the Haber process, production and uses of NPK fertilisers.<br>*Foundation tier*<br>*Students do not study alternative methods of extracting metals* | |
| | **What pupils will learn** | **How it builds on learning** |
| **Year 11** | **Energy Changes**<br>Exothermic and endothermic reactions, reaction profiles, energy changes in reactions, chemical cells and fuel cells.<br>Foundation tier<br>Students do not study energy changes in terms of bond energies | Allows revisiting of ideas in bonding and builds on year 9 unit introducing ideas of energy changes in chemical reactions. |
| | **Chemical changes**<br>Reactivity of metals, extraction of metals, oxidation and reduction in terms of electrons, reactions of acids, production of salts, pH scale and neutralisation, titration, strong and weak acids, electrolysis of molten ionic compounds and aqueous solutions, half equations, use of electrolysis for metal extraction.<br>*Foundation tier*<br>*Students do not study oxidation and reduction in terms of electrons*<br>*Students do not study strong and weak acids*<br>Students do not study half equations during electrolysis | Allows revisiting of ideas covered in quantitative chemistry in year 10 and also formation of ions in Atomic Structure unit. Builds on Reactions of Acids unit in year 8. |
| | **Rate and extent of Chemical Change**<br>Calculating rates of reaction, factors which affect rates, collision theory and activation energy, catalysts, equilibria and reversible reactions.<br>*Foundation tier*<br>*Students do not study the effect of changing conditions on equilibrium (including concentration, temperature and pressure* | Allows revisiting of ideas covered in year 10, including bonding. It also introduces the challenging concept of equilibrium at a stage where students are most likely to be prepared for it. In addition, it revisits the concept of the Haber process studied in year 10. |
| | **Organic Chemistry**<br>Crude oil, hydrocarbons and alkanes, fractional distillation, properties of hydrocarbons, cracking and alkenes, reactions of alkenes, alcohols, carboxylic acids, addition and condensation polymerisation, amino acids and DNA.<br>*Foundation tier*<br>*Students do not study condensation polymerisation*<br>*Students do not study amino acids* | This unit comes after Bonding and Atomic Structure units as it allows concepts in these units to be revisited. |

## Assessment

Students undertake formative assessments at the end of each topic. The aim of these is for students to be able to improve their understanding of the topic that they have just completed and to consolidate their learning. Students also undertake summative tests. In year 10 students have an exam after the Christmas holidays which focuses on Electricity and Radioactivity.

Students have another exam at the end of year 10 which covers all content covered in year 10 (content studied in year 10 is primarily Paper 1 content). In year 11 students take a mock exam in December, which covers paper 1 material, giving students an opportunity to revise and consolidate. Students then undertake a second mock in March which covers all the content covered in year 11.

## Supporting your child

**What you can do at home:**

Parents can support students in a number of ways, including:

- Supporting students with revision for tests – revision resources for these are provided via SatchelOne and Teams, along with instructions. It can be really helpful if parents can guide the students through using these resources.
- Reading about science – resources for could include texts provided by the school library or BBC Science Focus magazine.

**Equipment:**

In addition to standard school equipment, students should bring a green pen and a calculator to lessons.

## Extended learning

**Homework policy:**

Homework set is meaningfully related to classwork and includes: planning and writing up experiments, reading, note-taking and answering questions to aid understanding, and extending understanding of a topic through research and revision for the end of unit tests and end of year examinations. Homework will usually be set every two weeks for each subject, but the exact frequency of this is at the discretion of the teacher

**Clubs/ Enrichment opportunities:**

Enrichment opportunities are provided throughout year 10 and 11. All students are given the opportunity to undertake the British Physics Olympiad.

**Extended study suggestions and reading lists:**

The library has a range of texts and study guides to support learning. The BBC Bitesize for GCSE Science website contains up-to-date subject content that can be used for revision.

**Possible trips and visits:**

A number of STEM based trips are typically offered over the course of the year.