

Subject: Chemistry

Board: AQA

Year group: 9-11 (new 2015 specification)

Curriculum Map

Year 9 (Sept-July)

All students will be taught Topics 1-4 of the specification and will be assessed throughout as well as being expected to undertake various literacy based tasks, data based tasks, required practicals and progress tests, all of which will be banded to assist in judging progress made.

- 1) Atomic Structure and the periodic table
 - I. Students will learn about Atomic structure, History of the periodic table, Group chemistry and separating techniques
 - II. The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties.
 - III. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges.
 - IV. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provide evidence for the model of a nuclear atom with electrons in energy levels.

- 2) Bonding and Structure
 - I. Students will learn about Types of Bonding, properties and structure of substances, polymers and nanotechnology.
 - II. Chemists use theories of structure and bonding to explain the physical and chemical properties of materials.
 - III. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures.
 - IV. Theories of bonding explain how atoms are held together in these structures.
 - V. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.

- 3) Quantitative Chemistry
 - I. Students will learn about Conservation of mass, Relative formula mass, Mole calculations and Uncertainty
 - II. Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions.
 - III. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions.
 - IV. Chemical reactions can be classified in various ways and identifying different types of chemical reaction allows chemists to make sense of how different chemicals react

together, to establish patterns and to make predictions about the behaviour of other chemicals.

- V. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas.

4) Chemical Changes

- I. Students will learn about Reactivity series and displacement, Extraction of metals, Electrolysis and Redox
- II. Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organising their results logically.
- III. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms.
- IV. The extraction of important resources from the Earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'.

Year 10 (Sept-July)

All students will be taught Topics 5-8 of the specification and will be assessed throughout as well as being expected to undertake various literacy based tasks, data based tasks, required practicals and progress tests, all of which will be banded to assist in judging progress made.

5) Energy changes

- I. Students will learn about Exothermic and Endothermic reactions, Energy level diagrams, cells and batteries and applications of energy changes
- II. Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds.
- III. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic.
- IV. These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications.
- V. Some interactions between ions in an electrolyte result in the production of electricity.
- VI. Cells and batteries use these chemical reactions to provide electricity.
- VII. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way.

6) Rate and extent of chemical change

- I. Students will learn about Collision theory, Factors affecting rate and Equilibrium
- II. Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down.
- III. Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of a desired product. Understanding energy changes that accompany chemical reactions is important for this process.
- IV. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way.

7) Organic Chemistry

- I. Students will learn about Alkanes, Alkenes, Fuels and Combustion
- II. The chemistry of carbon compounds is so important that it forms a separate branch of chemistry.
- III. A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds.
- IV. This branch of chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are a major source of feedstock for the petrochemical industry.

- V. Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents.

8) Chemical Analysis

- I. Students will learn about Chromatography, Gas tests, Ions tests & Applications
- II. Analysts have developed a range of qualitative tests to detect specific chemicals.
- III. The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate.
- IV. Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small.
- V. Forensic scientists and drug control scientists rely on such instrumental methods in their work.

Year 11 (Sept-May)

All students will be taught Topics 9 & 10 of the specification and will be assessed throughout as well as being expected to undertake various literacy based tasks, data based tasks, required practicals and progress tests, all of which will be banded to assist in judging progress made. After finishing the course, there will be ample time allotted to revision of all topics as well as exam technique and practice.

9) Chemistry of the atmosphere

- I. Students will learn about Early atmosphere, atmospheric change, human effects on the environment.
- II. The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles.
- III. Scientists use very complex software to predict weather and climate change as there are many variables that can influence this.
- IV. The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.

10) Using resources

- I. Students will learn about Sustainability & Water treatment
- II. Industries use the Earth's natural resources to manufacture useful products.
- III. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised.
- IV. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised.

Exam Board, Qualification and Specification Code:

AQA

Combined Science (8464)

Chemistry only (8462)

Useful Websites and Resources:

Revision World - <https://revisionworld.com/gcse-revision>

CGP books - https://www.cgpbooks.co.uk/interactive_gcse_science

Doc Brown - <http://www.docbrown.info/gcscscience.htm>

<http://www.aqa.org.uk/subjects/science/gcse/chemistry-8462> This website has a summary of what students need to know for their GCSE Chemistry studies across all years.

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