



KS4 Curriculum Overview

Combined & Separate Chemistry

Curriculum Intent

Our ambition is for all students to understand Chemistry as the science of matter, based on atoms, able to explain the properties of matter and predict changes that may occur.

Students who are able to effectively propose and investigate a hypothesis are scientists by definition. Through investigation students learn how to make sense of the natural world. They are able to marvel at the beauty of nature and the elegance of its laws and apply this understanding to solve real world problems.

How does the KS4 curriculum build on that from KS3?

It is important to note that we cannot assume the KS3 science curriculum has been effectively delivered; Covid-19 remote learning implications are evident in student's cumulative disfluency. In KS3 we reinforce macroscale ideas and then push students beyond KS3 by considering how microscopic (in biology) or nanoscopic (in chemistry and physics) processes act as drivers for the macroscopic observations. Linking what they can see to the theory of what they can't see is accepting the explanation proposed.

What do students *do* with this knowledge or these skills?

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We are increasingly looking for students to be able to carry out full scientific investigations. Over time students should increasingly be able to:

- propose a hypothesis
- design an experiment
- select suitable apparatus
 - identify a variable to change, measure and explain how all others will be controlled
- select a suitable method to record and present data and any relationships therein, followed by a sensible conclusion
 - write an honest evaluation of the validity of the method and the reliability of the data

How does the KS4 curriculum align to the National Curriculum?

In Year 10 students deepen their understanding and ability to link reactions and make predictions of rates based on their atomic knowledge and environmental conditions. The final chapters of the GCSE curriculum are designed to summarise and apply many chapter's student's knowledge from the previous years; Chemistry macroscopic atmosphere and cycles.

What new knowledge or skills are students taught?

Term	Year 10	Year 11
Autumn	<p>Structure & bonding</p> <ul style="list-style-type: none"> Explain how atoms bond to each other in elements and in compounds. Explain the formula of elements and compounds, knowing the structure of the atoms and the type of bonding involved. Explain the difference between metals and non-metals in terms of their atomic structures and bonding. <p>Predicting reactivity based on bonding.</p> <p>Quantitative chemistry</p> <ul style="list-style-type: none"> Carry out calculations using reacting masses to predict balanced symbol equations for reactions. Carry out calculations using balanced symbol equations to predict the amounts of reactants and products. Calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product. HT 	<p>Organic chemistry</p> <ul style="list-style-type: none"> How fractional distillation is used to separate different fractions from the mixture of hydrocarbons in crude oil. The products of complete and incomplete combustion of fuels from crude oil, and the use of thermal decomposition in the process of cracking large hydrocarbons into smaller, more useful products. <p>Chemical analysis</p> <ul style="list-style-type: none"> A wide range of chemical tests to identify unknown gases and ions and why instrumental analysis is used in many applications
Spring	<p>Chemical changes</p> <ul style="list-style-type: none"> Describe and evaluate metal extraction processes such as reduction and electrolysis. State the products of the electrolysis of ionic compounds when molten and in solution Describe the products of neutralisation reactions Explain how to produce a pure, dry sample of a soluble salt. <p>Energy changes</p> <ul style="list-style-type: none"> Evaluate uses and applications of exothermic and endothermic reactions Describe; activation energy is the energy needed for a reaction to occur 	<p>Chemistry of the atmosphere</p> <ul style="list-style-type: none"> How the atmosphere developed over the earth's history before arriving at its current composition How climate change is caused by increasing levels of greenhouse gases and how this issue needs to be addressed. <p>Paper 1 and 2 revision</p> <ul style="list-style-type: none"> Focussing on drawing ideas together from across Years 7-11, making scientific links & understanding the results and conclusions from Scientific Investigations.
Summer	<p>Rates of chemical change</p> <ul style="list-style-type: none"> How to apply the particle model in the collision theory to explain the effect of changing conditions e.g. temperature on the rate of reaction. Explain how catalysts can affect the rate of a reaction in terms of their effect on the activation energy of the reaction <p>Using resources</p> <ul style="list-style-type: none"> How to analyse data on our diminishing finite resources, including order of magnitude estimations, and Life Cycle Assessments to judge the impact of making new materials. Describe how traditional methods for extracting copper are damaging to the environment and new methods for the extraction of copper. HT 	GCSE external examinations

Rationale for sequencing	<p>Students will spend the majority of Year 10 learning the subject content for their GCSE science course; combined or separate.</p> <p>The focus of the end of year assessment will be on the content for the paper 1 examinations</p> <p>Students will finish learning the subject content for the paper 2 assessments in November examinations. The focus then becomes a targeted revision programme to review all content for paper 1 and paper 2 assessments, with paper 1 assessments in the Spring. The focus will then be on preparing the students for their GCSE examinations in the Summer. All of the subject content will be reviewed and the key skills will be practiced. A variety of structured revision activities will be used to allow students to identify areas for development and subsequently improve their substantive and disciplinary knowledge.</p>
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