KS3 Curriculum Overview

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 KS3 curriculum build on that from KS2?

The priority at KS2 is to gain an understanding of how to undergo a scientific investigation and by consideration of macroscopic observation (e.g. classifying rocks, classifying living things, investigating magnetism). In Y7 especially, we reinforce these ideas and then push students beyond KS2 by considering how microscopic (in biology) or nanoscopic (in chemistry and physics) processes act as drivers for the macroscopic observations.

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

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 KS3 curriculum align to the National Curriculum?

Whilst students will have been taught science at Primary school, we want to introduce them to the subject as specialists. Students should appreciate Chemistry as the building blocks of matter, atoms and the reactions they undergo. In Year 8 students should develop their understanding of atoms to see how their interactions are predictable and give rise to the properties of matter and their reactions. In Year 9 students complete KS3 by linking together and also learn to appreciate that chemical reactions have a huge impact on our environment, and the factors that affect this.

What new knowledge or skills are students taught?			
Term	**Year 7**	**Year 8**	**Year 9**
Autumn	**Properties of matter** • Particles in solid are close, and vibrate, in liquid particles are close but move randomly, gas particles are far apart moving in all directions. • Pure substance consists of only one type of element or compound and has a fixed melting point. • Mixtures may be separated due to different physical properties. The method then depends on these individual properties.	**Rates of reactions** • During a chemical reaction, bonds are broken (requiring energy) and new bonds are formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse it is endothermic. • Observations that indicate chemical reactions. • Activation energy is the minimum amount of energy that must be provided to compounds to result in a chemical reaction	**Environmental chemistry** • 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. • How to analyse data on our diminishing finite resources, including order of magnitude estimations, and carry out Life Cycle Assessments to judge the impact of making new materials.
Spring	**Atomic structure** • Atoms contain sub-atomic particles; protons, neutrons & electrons. • Protons are positively charged, electrons are negatively charges and neutrons are uncharged. • The periodic table classifies all chemical elements based. • Elements in the same groups have similar properties due to the number of electron in their outer shell but differ in reactivity due to the different number of electron shells.	**Structure & bonding** • There are different types of that hold elements together. • The bonds that form are different between non-metal & non-metal, non-metal & metal and metal & metal. • Bonding affects the reactivity of elements and compounds and can be used to predict trends in reactivity. • There are many different observations that can be made to identify when reactions are taking place. • Predicting reactivity based on structure.	**Atomic structure** • Atoms are made up of differing numbers of three different sub-atomic particles (protons, neutrons and electrons). • The history of the periodic table.
Summer	**Chemical reactions** • The pH of a solution depends on the strength of the acid. Strong acids have lower pH than weaker acids. • Mixing an acid and alkali produces a chemical reaction. Neutralisation reaction forms chemical called a salt, and water. • Metals and non-metals react with oxygen to form oxides, which are either bases or acids • Metals can be arranged as a reactivity series in order of how readily they react with other substances.	**Acids & alkalis** • Health and safety, risk assessments, taking measurements and recording data • Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat or light. Thermal combustion is a reaction where a single reactant is broken down into simpler products by heating. • Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products.	**Atomic structure** continues… • Use atomic structure to explain patterns in reactivity in the periodic table • Reactivity and property trends for elements in groups 1, 7 and 0 • Describe changes of state and chemical reactions in terms of energy transfers. • Using the periodic table to make predictions.
Rationale for this sequencing	Students's curriculum knowledge builds in breadth and depth as they progress through KS3 science. Each term and topic focussing on key threads through the three sciences; biology chemistry and physics. There is also a core focus throughout the curriculum on developing key practical skills to become young scientists.		

Additional support at home	
Additional reading for enjoyment, enhancement and extension	• Everything you know about science is wrong by Matt Brown
Online resources to practice, consolidate and revise	• BBC Bitesize • Kay Science
Workbooks & revision guides to practice, consolidate and revise	• Higher: KS3 Study Guide • Foundation: KS3 Study Guide

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