JAMES CALVERT SPENCE COLLEGE

Curriculum Overview

BE KIND
WORK HARD
AIM HIGH

CHEMISTRY

At James Calvert Spence College, we provide a broad and balanced, ambitious curriculum for all pupils. Our chemistry curriculum builds upon the knowledge and skills pupils have developed in first school through a well-planned and sequenced curriculum. Our curriculum plans follow the National Curriculum as well as drawing upon best practice within the field of chemistry. We draw on evidence-based research to ensure our curriculum is high quality and meets the needs of our pupils. We provide regular opportunities to revisit learning, so it becomes embedded in our pupils' long-term memory. Disciplinary knowledge such as scientific skills, data analysis and practical opportunities, are embedded within the topics covered. The overview of our plan is below:

***Important note:** Due to some teaching groups being shared between two or three science teachers, the order in which topics are taught may vary slightly between classes. Rest assured, all students will receive full coverage of the curriculum within the academic year.

Assessment: Assessments are provided in line with the school's assessment schedule and written feedback is calendared for pupils. We also provide live feedback as described below.						
Year	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
7*	**Scientific skills** Pupils will be given the opportunity to develop their scientific skills at the start of year 7. They will be introduced to laboratory safety including risks and hazards and will gain experience in using appropriate apparatus, set up and use a bunsen burner. Pupils will deepen their knowledge of asking scientific questions, identifying and choosing appropriate variables, and plan their own investigations. **The particulate nature of matter** In this topic, students are introduced to the fundamental concept of matter and how it		**Pure and Impure Substances** In this topic, students learn to distinguish between pure substances and mixtures. They explore how mixtures can be separated using physical techniques such as filtration, evaporation, distillation, and chromatography. Students investigate the properties of pure substances, including fixed melting and boiling points, and how these differ from mixtures. The topic introduces the concept of solubility and solutions, including solute, solvent, and concentration. Through practical work, students develop skills in planning, observing, and recording results while interpreting evidence to identify substances and assess purity. This topic		**Chemical Reactions** In this topic, students are introduced to the concept of chemical change and how it differs from physical change. They learn to recognise the signs of a chemical reaction—such as colour change, gas production, and temperature change—and explore examples including combustion, oxidation, and neutralisation. Students develop an understanding of word equations to represent reactions and begin to classify reactions based on their characteristics. The particle model is used to explain what happens during a chemical change at the molecular level. Through practical investigations, students build skills in observation, recording,	

	behaves. They learn about the particle model of solids, liquids, and gases, using it to explain the properties of different states of matter and the changes between them. Students explore the effects of temperature and energy on particle movement during melting, freezing, evaporation, condensation, and sublimation. The topic introduces key terms such as diffusion, density, and conservation of mass. Through practical investigations and particle diagrams, students develop their understanding of the microscopic world and gain confidence in using models to explain macroscopic observations. This topic lays the foundation for further chemistry topics by building a clear understanding of the nature and behaviour of materials.	builds foundational knowledge for analytical chemistry and reinforces the importance of careful experimental design and observation.	and drawing conclusions while learning how to work safely with reactive substances. This topic lays the groundwork for understanding more complex chemical processes in later years.
8*	**Acids and bases** In this topic, students explore the properties and reactions of acids and bases. They learn how to identify common acids and bases in everyday substances and investigate their characteristic reactions, including neutralisation. Students use indicators, such as litmus and universal indicator, to measure pH and classify substances as acidic, neutral, or alkaline. The topic covers the importance of pH in real-world contexts, such as agriculture, digestion, and environmental science. Practical work develops students' skills in safe handling of chemicals, accurate measurement, and recording of data. Through experiments and explanations, students build a foundational understanding of acid-base chemistry and its relevance to everyday life and industry.	**Metals and their reactions** In this topic, students investigate the properties of metals and how they react with other substances. They learn about common reactions of metals, including reactions with oxygen (oxidation), water, and acids, and explore how these reactions produce metal oxides, hydrogen gas, and salts. Students study the reactivity series to predict and explain the outcomes of metal displacement reactions. The topic also covers practical methods for extracting metals from ores and the importance of metal recycling. Through hands-on experiments, students develop skills in observation, measurement, and safe handling of reactive metals, while deepening their understanding of chemical reactivity and practical applications in everyday life.	**Earth and its resources** In this topic, students explore the composition and structure of the Earth and the natural resources it provides. They learn about different types of rocks, minerals, and fossil fuels, and how these resources are formed and extracted. Students investigate the importance of sustainable use and management of Earth's resources, including water, minerals, and energy sources. The topic covers renewable and non-renewable resources and the environmental impact of their extraction and use. Through research and practical activities, students develop an understanding of how science informs conservation efforts and the challenges of balancing human needs with protecting the planet.
9	**Atomic Structure** In this topic, students explore the fundamental structure of atoms, learning about protons,	**Periodic Table** In this topic, students explore the organisation of elements in the periodic table and how it reflects	**Earth's Atmosphere** In this topic, students investigate the composition and structure of the Earth's atmosphere and the processes that shape our

	neutrons, and electrons and how they are arranged within the atom. They study the concept of atomic number, mass number, isotopes, and ions, and how these relate to the elements in the periodic table. The topic introduces models of the atom, from early theories to the modern nuclear model, helping students understand how scientific ideas develop over time. Students also investigate how atomic structure influences chemical properties and bonding. Practical work develops skills in using models, interpreting data, and applying knowledge to explain the behaviour of elements.	their properties and atomic structure. They learn about groups, periods, metals, non-metals, and metalloids, and how elements are classified based on similar chemical behaviours. The topic covers trends such as atomic size, reactivity, and valency, helping students predict the properties of elements and their compounds. Students also study the historical development of the periodic table and the significance of modern periodic law. Practical activities reinforce understanding of element properties and group characteristics, fostering skills in analysis and scientific reasoning.	planet. They learn about the layers of the atmosphere, the gases present, and their roles in supporting life and regulating climate. The topic covers the greenhouse effect, global warming, and human impacts on atmospheric conditions. Students explore weather patterns, air pollution, and strategies for reducing environmental damage. Through data analysis, research, and practical investigations, students develop an understanding of Earth's dynamic systems and the importance of protecting our atmosphere for future generations.
10	**Combined Science** **Atomic structure and Periodic table** Building upon knowledge gained from key stage 3, pupils will further embed their knowledge of the atom, including the concept of isotopes (which links with the atomic structure topic in GCSE physics). pupils will also learn the development of the atomic model over time and how scientific ideas can change over time when the scientific community is presented with new evidence. They will deepen their understanding of the relationship between the properties of each element and its position in the periodic table. **Bonding, structure and properties of matter** Pupils use their knowledge of the atom to understand the different types of bonding.	**Combined Science** **Quantitative Chemistry** Pupils will also learn how to use the periodic table to calculate relative formula mass and percentage by mass of molecules in chemical reactions. **Bonding, structure and properties of matter** Pupils apply their retrieved knowledge of the different types of bonding and apply to the respective structures. **Chemical Changes** Building upon knowledge from key stage 3, pupils will deepen their understanding of the reactions of acids, alkalis and metal carbonates to form salts. Building upon knowledge of metal reactions from key stage 3, pupils will deepen their understanding of the reactivity of metals and how this applies to displacement reactions. They will also learn how metals react with water. oxygen and acids.	**Combined Science** **Chemical changes (continued)** Pupils will continue to build on the reactivity of metals. They will then understand the concept of electrolysis and apply knowledge of ions from the previous term to this concept, linking to industrial processes. **Energy changes** Pupils will also build on their knowledge from key stage 3 to deepen their understanding of exothermic and endothermic reactions, together with developing their practical skills.

10	**Separate science** **Atomic structure and Periodic table** Building upon knowledge gained from key stage 3, pupils will further embed their knowledge of the atom, including the concept of isotopes (which links with the atomic structure topic in GCSE physics). Pupils will also learn the development of the atomic model over time and how scientific ideas can change over time when the scientific community is presented with new evidence. They will deepen their understanding of the relationship between the properties of each element and its position in the periodic table. **Bonding, structure and properties of matter** Pupils use their knowledge of the atom to understand the different types of bonding. **Quantitative Chemistry** Pupils then progress onto chemical calculations which is new content and requires links to maths skills.	**Separate science** **Quantitative Chemistry (continued)** Pupils continue with theoretical mass and % yield calculations. They then build on this to the new content of challenging limiting factor calculations. Finally, % atom economy, and molar volume calculations. **Bonding, structure and properties of matter** Pupils apply their retrieved knowledge of the different types of bonding and apply to the respective structures. **Chemical changes** Pupils then move onto developing new practical skills, specific to separate science. Titration is a technique used by industrial chemists. They discover how to identify unknown concentrations using results from their practical analysis and calculations. Building on knowledge gained in key stage 3, about acids and pupils start to study the chemistry behind neutralisation and also deepen their understanding of the reactions of acids, alkalis and metal carbonates to form salts. Metal reactions retrieved from key stage 3, will support their understanding of the reactivity of metals and how this applies to displacement reactions. They will also learn how metals react with water. oxygen and acids.	**Separate science** **Chemical changes (continued)** Retrieval of ionic bonding will support pupils to understand the concept of electrolysis and apply knowledge of ions to this industrial process. How batteries work and fuel cells is new learning linked to this concept. **Energy changes** Finally, pupils will deepen their understanding of exothermic and endothermic reactions from key stage 3. They then apply their mathematical and practical skills to deepen their understanding of the bond energies involved in making and breaking bonds. **Chemistry of the atmosphere** Over the summer, pupils complete self-study, working independently revisiting and building their knowledge of chemistry of the atmosphere
11	**Combined Science** **Rate and extent of chemical change** Pupils use their mathematical and graph skills to look at rates of reaction. They develop their practical skills and understand the concepts of factors which make a reaction go faster. This builds on prior learning developed in key stage 3	**Combined Science** **Chemical analysis (continued)** Pupils continue to build on practical skills developed in key stage 3 and revisit chromatography and testing gases. **Chemistry of the atmosphere**	**Combined Science** **Using resources (continued)** The final topic focuses on building on knowledge gained throughout the science course. Pupils make links to different materials such as renewable resources and use mathematical skills to interpret graphs, calculate means and

	and year 10. **Organic Chemistry** Pupils then study new content looking at crude oil and how it is chemically extracted to produce useful materials. **Chemical analysis** Pupils build on practical skills developed in key stage 3 and revisit chromatography and testing gases.	Pupils will continue with understanding how the Earth's atmosphere developed, building on prior learning from key stage 3. They will revisit the impact of pollution, global warming and climate change. **Using resources** The final topic focuses on building on knowledge gained throughout the science course. Pupils make links to different materials such as renewable resources and use mathematical skills to interpret graphs, calculate means and understand uncertainty of data. They also revisit how we obtain potable (drinking water), how to analyse it and the chemistry involved in managing the sewage system.	understand uncertainty of data. They also revisit how we obtain potable (drinking water), how to analyse it and the chemistry involved in managing the sewage system. **Preparation for external examinations**
11	**Separate science** Depending on progress, pupils may continue with the energy changes topic, focusing on bond energy calculations, batteries and fuel cells. Pupils will also be assessed on their summer work. **Rate and extent of chemical change** Pupils use their mathematical and graph skills to look at rates of reaction. They develop their practical skills too and understand the concepts of factors which make a reaction go faster. This builds on prior learning developed in key stage 3 and year 10. They then study the new concept of equilibrium and how chemists can modify reactions to be more efficient and effective. **Chemical analysis** Pupils then go onto develop their analytical skills by practically identifying unknown compounds using specific analytical tests.	**Separate science** **Organic chemistry** Pupils then study new content looking at crude oil and how it is chemically extracted to produce useful materials.This includes the study of organic compounds which is a challenging topic and pre A-level as it is also studied in A-level chemistry. Links to the impact of pollution, global warming and climate change are considered by revisiting the chemistry of the atmosphere topic. **Using resources** The final topic focuses on building on knowledge gained throughout the science course. Pupils make links to different materials such as renewable resources and use mathematical skills to interpret graphs, calculate means and understand uncertainty of data. They also revisit how we obtain potable (drinking water), how to analyse it and the chemistry involved in managing the sewage system.	**Separate science** **Using resources (continued)** The final topic focuses on building on knowledge gained throughout the science course. Pupils make links to different materials such as renewable resources and use mathematical skills to interpret graphs, calculate means and understand uncertainty of data. They also revisit how we obtain potable (drinking water), how to analyse it and the chemistry involved in managing the sewage system. **Preparation for external examinations**

Examples of on-going assessment and feedback in lessons
● Verbal feedback by the teacher to the whole class which pupils act on in the lesson; this is often evidenced using green pen. ● Pupils self-assess or peer-assess work with a clear framework guiding them through this. ● Teachers circulate to give 'LIVE' and immediate feedback as pupils are working independently. ● Pupils may complete mini quizzes or retrieval activities that revisit prior learning and receive verbal feedback. ● Use of tailored questioning by the teacher.