Year 9 Curriculum Chemistry – 2022-23

	Autumn Term		Spring Term		Summer Term	
	1	2	1	2	1	2
Key Concepts	Atoms and the Periodic Table		Practical Skills and Chemical Bonding		Practical Skills and Revision	
National Curriculum Knowledge & Understanding	Atoms and the Periodic Table In this topic, pupils will develop their understanding of atoms as fundamental chemical building blocks and develop Daltons simple atomic model further providing ample opportunity to foster their working scientifically skills, specifically around the development and use of models within science. Pupils will describe the evidence that leads to each new stage in the development of the atomic model and the importance of peer review as they will presented with historical evidence in the development of the periodic table. They will be introduced to and learn that atoms of the same element can have different structures as they have different numbers of neutrons; these atoms are called isotopes of that element. Within the study of this unit pupils will continue in their study of the Periodic Table and how patterns in reactions can be predicted. They will see how to interpret chemical formulae and extend their KS3 knowledge of the formation of reactants into		Skills Builder Pupils have had some practical opportunities within chemistry, but this unit this will aid their social skills using Skills Builder but will also focus on key mathematical principles to aid in the analysis of data and enable conclusions to be made. Pupils will develop observation skills, select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent,	Chemical Bonding In this unit, pupils will develop their understanding of the states of matter from KS3 as they will build on their understanding of the particle model and use this to explain the energy transfers involved when substances change state. Pupils already know that different substances such as metals and non-metals have different properties, but they do not know the reasons why. This unit will	Skills Builder Pupils have continued developing working scientifically skills. This unit will further and continue to aid their social skills using Skills Builder but will also focus on key underlying mathematical principles to aid in the analysis of data and enable conclusions to be made. Pupils will develop observation skills, select, plan and carry out the most appropriate types of scientific enquiries to test predictions,	Revision Pupils will also use a variety of revision techniques and strategies to enable them to focus their independent revision on areas they need to further develop for their end of year assessment.

	products, reinforcing differences, between atoms, elements, compounds.	dependent and control variables, where appropriate. Furthermore, this section will enable pupils to revisit these key principles and separation techniques enabling them to secure skills, knowledge and to apply and answer scientific questions about the world around them by carrying out investigations focusing on producing valid experimental results and data analysis.	examine the fundamental principles of atomic structure linking them to how different substances i.e. metals, non-metals and different types of compounds are bonded together and how this affects their properties.	including identifying independent, dependent and control variables, where appropriate. Furthermore, this section will enable pupils to revisit these key principles enabling them to secure skills, knowledge and to apply and answer scientific questions about the world around them by carrying out investigations focusing on producing valid experimental results and data analysis.	
Assessment	Assessed end of unit test.	Practical assessment of skills	Assessed end of unit test.	Practical assessment of skills	End of year assessment
Why this? Why now?	Pupils will develop their understanding of atoms as fundamental chemical building blocks. Pupils will also develop their	Working scientifically skills are an important and	In a prior unit, pupils have already learned that different	Working scientifically skills are an important and	In this section pupils will revisit vital aspects of each unit and

	understanding of the differences between compounds and mixtures, and how mixtures can be separated using techniques such as filtration, crystallisation, distillation, and chromatography. Studying the development of the atomic model will lead into the model currently accepted for GCSE. Pupils know that the basic unit of a substance is the atom. However, they have not considered how we know about the structure of atoms and the subatomic parts of the atom. This module will focus on how scientific theories change. Pupils will see how to interpret chemical formulae and extend their KS3 knowledge of the law of the conservation of mass, leading them to balance chemical equations. It is important that they understand that when balancing an equation, the formula of the substance must not change. By this point pupils' skills should be developed enough for them to objectively evaluate what makes a good model and realise when newer models need to be proposed. This topic will continue embedding how and why chemistry models have changed over time as well as developing their knowledge for KS4 of how atomic structure links to an elements position in the periodic table. They have basic knowledge of the structure of the Periodic Table from year 8, but now	integral aspect in chemistry. Pupils need to be able to identify variables and carry out investigations using their skills to obtain valid results to investigations. This unit will continue in the development of the working scientifically aspect of KS3 National Curriculum as maths and literacy skills. This unit will build on skills from KS2 and from years 7 and 8 where they have already had some opportunities for developing working scientifically and practical working skills. This will also aid in the enhancement of social skills such as working in	elements have different properties which is related to their atomic structure. This will be revisited further in this unit but they will now discover that they way in which elements react together and the properties of new substances is down to the type of bonds that are formed between them. They should know that covalent bonding is the sharing of one or more pairs of electrons between non-metal atoms; ionic bonding involves a metal and non-metal atom, with the metal atom losing one or more electrons and the non-metal atom gaining one or	integral aspect in chemistry, which is why pupils will continue in their learning. Pupils need to be able to continually identify variables and carry out investigations using their skills to obtain valid results to investigations. This unit will continue in the development of the working scientifically aspect of KS3 National Curriculum as maths and literacy skills. This unit will build on skills from KS2 and from years 7 and 8 where they have already had some opportunities for developing working scientifically and practical working skills. This will also aid in the	mathematical skills studied in preparation for their end of year assessment. It is important pupils revisit scientific concepts in order to aid understanding and retention of scientific concepts to enable form foundations to be made.

	they will learn the stages of its development. Knowledge about the periodic table will then be utilised and developed in greater depth through units of learning in subsequent years, when pupils will forge links with atomic structure, periods and groups and the formation of ions, which then can be linked with the different types of bonding that occurs and then linked into units such as electrolysis.	groups to carry out investigative processes required. This is especially important post-covid where opportunities for practical group work may have been less frequent. Working scientifically skills are an imperative aspect of future learning as they are tested on throughout KS4 in the completion of required practical's for biology, chemistry and physics and in KS5 pupils practical skills will become more refined. These opportunities are essential for building skills ready for further education, apprenticeships	more electron; and metallic bonding involves a delocalised sea of electrons surrounding the positive metal ions. As pupils are now able to describe difference in bonding and properties of giant ionic structures, simple covalent molecules, and giant covalent structures they should understand that covalent, metallic, and ionic bonding is strong, but that it is how the particles interact (intermolecular forces) that determines properties such as melting point, boiling point, and electrical conductivity. Therefore, in future study of	enhancement of social skills such as working in groups to carry out investigative processes required. This is especially important post-covid where opportunities for practical group work may have been less frequent. Working scientifically skills are an imperative aspect of future learning as they are tested on throughout KS4 in the completion of required practical's for biology, chemistry and physics and in KS5 pupils practical skills will become more refined. These opportunities are essential for building skills	

		and employment opportunities in the future.	related topics such as electrolysis, fractional distillation and separating techniques pupils will be able to draw on their knowledge and understanding to provide explanations of these phenomena.	ready for further education, apprenticeships and employment opportunities in the future.	
Skills & Characteristics	**Listening** Pupils will have opportunities to develop their listening skills throughout this academic year, specifically when being given instructions for investigative work. They will also listen to each other throughout group work and opportunities for presenting their work. **Problem Solving** Pupils will use problem solving skills when evaluating the results from investigative processes. They will work collaboratively to explain why anomalous results may occur. **Aiming High** All pupils will set clear, tangible goals and which can especially be met during investigative work and using level ladders in assessments. **Teamwork:** Pupils will be required to work in a group whilst carrying out practical work or problem-solving activities showing that these skills are necessary in the world of work irrespective of career choice.				
Aspirations & Careers	**CEIAG** Medical Experience days Careers Fairs Work Experience				

	Cultural Capital Pupils are encouraged to make links between current events, such as using hybrid vehicles and climate change and our Chemistry learning in the classroom. All pupils take advantage of our excellent links with the RSC and Newcastle University for off site visits and in school activities. **Extracurricular** Stem Club Durham University Chemistry Lecture series

Year Group	Basic (Lower Ability End Points)	Clear (Middle Ability End Points)	Detailed (Higher Ability End Points)

9	Pupils recall straightforward scientific knowledge and terminology of materials and their properties. They describe phenomena and processes, drawing on abstract ideas. They explain processes and phenomena such as the development of the atom and periodic table using more than one step or using a model. They apply and use knowledge and understanding in familiar contexts, such as identifying the key parts of the plum-pudding model and the nuclear model of the atom. They recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as basing separation methods for mixtures on physical and chemical properties. They describe applications and implications of science, such as the uses of metals based on their specific properties. **Working Scientifically** Pupils decide appropriate approaches to a range of tasks, including selecting sources of information and apparatus. They select and use methods to obtain data systematically. They recognise hazard symbols and make, and act on, simple suggestions to control obvious risks to themselves and others. They use line graphs to present data, interpret numerical data and draw conclusions from them. They analyse findings to draw scientific conclusions that are consistent with the evidence. They communicate these using scientific and mathematical conventions and terminology. They evaluate their working methods to make practical suggestions for improvements.	Pupils recall detailed scientific knowledge and terminology of properties of materials. They describe phenomena and processes using abstract ideas, such as the structure of the atom. They take account of a number of factors or use abstract ideas or models, such as word equations, in their explanations of phenomena and processes. They apply and use knowledge and understanding, such as relating describing the differences between the plum-pudding and the nuclear model of the atom in unfamiliar contexts. They describe some evidence for some accepted scientific ideas, such as the patterns of reactivity in groups of the periodic table. They explain the importance of some applications and implications of science, such as the production of new materials with specific desirable properties. **Working Scientifically** Pupils identify an appropriate approach in investigatory work, selecting and using sources of information, scientific knowledge and understanding. They select and use methods to collect adequate data for the task, measuring with precision, using instruments with fine scale divisions, and identify the need to repeat measurements and observations. They recognise a range of familiar risks and take action to control them. They record data and features effectively, choosing scales for graphs and diagrams. They analyse findings to draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain them and account for any inconsistencies in the evidence. They manipulate numerical data to make valid comparisons and draw valid conclusions. They communicate qualitative and quantitative data	Pupils recall detailed scientific knowledge and terminology of properties of materials and make links between different areas. They describe a wide range of phenomena and processes using abstract ideas and sequencing a number of points, for example evaluating the current model of an atom. They make links between different areas of science in their explanations, such as between the nature and behaviour of materials and their particles. They apply and use more abstract knowledge and understanding, such as predicting how an element will react when given information on another element in the same group, and symbols and formulae for elements and compounds, in a range of contexts. They explain how evidence supports some accepted scientific ideas, such as the use of a model to explain the physical properties of a small molecule and discuss the limitations of various molecular models. They explain, using abstract ideas where appropriate, the importance of some applications and implications of science, such as the need to consider the availability of resources, and environmental effects, in the production of materials. **Working Scientifically** Pupils plan appropriate approaches and procedures, by synthesising information from a range of sources and identifying key factors in complex contexts and in which variables cannot readily be controlled. They select and use methods to obtain reliable data, including making systematic observations and measurements with precision, using a range of apparatus. They recognise the need for a risk assessment and consult appropriate sources of information, which they follow. They record data in graphs, using lines of best fit. They analyse findings to draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain these conclusions and identify possible limitations in primary and secondary data. They use quantitative relationships between variables. They communicate effectively, using a wide range of scientific and technical

		effectively, using scientific conventions and terminology. They evaluate evidence, making reasoned suggestions about how their working methods could be improved.	conventions and terminology, including symbols and flow diagrams. They begin to consider whether the data they have collected are sufficient for the conclusions they have drawn.