Chemistry Curriculum Overview – Year 9

Sequencing of topics	What knowledge will students develop?(Including key terminology)	What skills will students develop? (Including literacy & numeracy)	Assessment opportunities	Homework opportunities	Personal development (Ursuline Values, Catholic Social Teaching, Cultural Capital, Cross-curricular, Careers)	Curriculum links
Autumn Term 1						
Atomic Structure and the Periodic Table	○ Atoms, elements and compounds ○ Separation of Mixtures	○ Name and write the symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7 and the Noble gases ○ Calculate the number of protons, electrons and neutrons in different elements. ○ Name compounds of these elements from given formulae or symbol equations ○ Write word equations for the reactions ○ Write formulae and balanced chemical equations for the reactions ○ Describe, explain and give examples of the specified processes of separation ○ Suggest suitable separation and purification techniques for mixtures when given appropriate information. ○ Describe why the new evidence from the scattering experiment led to a change in the atomic model	○ AFL in lessons ○ Targeted questioning ○ Mid Topic assessment ○ End of Topic test	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ SAM learning ○ Satchel Quizzes	○ **United in harmony** when we consider the wider uses of materials and medicine ○ **Grateful** for the beauty of the different types of atoms ○ **Faith-filled and hopeful** when seeing beyond the naked eye ○ **Discerning and joyful** at the possibilities of science and medicine ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Service and sacrifice** when we recognise the scientific work that has been done before us ○ **Dignity of the human person** when considering healthcare ○ **Courageous and resilient** when we consider how the atom and periodic table were developed	KS1/2 ○ Solids, liquids and gases ○ Changes of state ○ The water cycle ○ Classifying materials ○ Dissolving ○ Reversible changes KS3 ○ Yr 7 Particle model ○ Separating mixtures ○ Yr 8 ○ Elements ○ Periodic table KS4 ○ Yr 10 Quantitative chemistry KS5 Yr 12 ○ Mass number and Isotopes ○ Electron configuration ○ Periodicity ○ Group 2, the alkaline earth metals ○ Group 7, the halogens ○ Yr13

	○ The development of the model of the atom ○ Relative electrical charges of subatomic particles ○ Size and mass of atoms ○ Relative atomic mass ○ Electronic structure ○ Development of the periodic table	○ Describe the difference between the plum pudding model of the atom and the nuclear model of the atom. ○ Describe how and why the atomic model has changed over time. ○ Describe the structure of the atom. ○ Use the nuclear model to describe atoms. ○ Describe why atoms have no overall charge. ○ Use the periodic table to identify the number of protons in different elements. ○ Describe the structure of the atom ○ Calculating number/size/mass of particles ○ Relate size and scale of atoms to objects in the physical world. ○ Calculate the relative atomic mass of an element given the percentage abundance of its isotopes ○ Represent the electronic structures of the first twenty elements of the periodic table in the form of numbers or diagram ○ Explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number. ○ Predict possible reactions and probable reactivity of elements from their positions in the periodic table. ○ Describe the steps in the development of the periodic table.				○ Properties of period 3 elements and their oxides ○ Transition metals

	○ Metals and non-metals ○ Group 0 ○ Group 1	○ Describe and explain how testing a prediction can support or refute a new scientific idea. ○ Explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties. ○ Explain how the atomic structure of metals and non-metals relates to their position in the periodic table. ○ Explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number. ○ Explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms. ○ Predict properties from given trends down the group ○ Predict possible reactions and probable reactivity of elements from their positions in the periodic table. ○ Describe the reactions of the first three alkali metals with oxygen, chlorine and water. ○ Explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms. ○ Predict properties from given trends down the group				

	○ Group 7 ○ Properties of transition metals (chemistry only)	○ Describe the nature of the compounds formed when chlorine, bromine and iodine react with metals and non-metals. ○ Explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms. ○ Predict properties from given trends down the group ○ Carry out displacement reactions using KCl, KBr, KI ○ with waters of the corresponding halogens. ○ Write word and balanced symbol equations for all reactions in the displacement practical ○ Describe properties of Transition metals ○ Describe the difference compared with Group 1 in melting points, densities, strength, hardness and reactivity with oxygen, water and halogens. ○ Further skills: Recognise expressions in standard form. Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects				

Autumn Term 2						
Bonding, structure, and the properties of matter	○ Ionic bonding ○ Ionic compounds ○ Covalent bonding	○ Draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7 ○ Work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. ○ Translate data between diagrammatic and numeric forms ○ Deduce that a compound is ionic from a diagram of its structure in one of the specified forms ○ Describe the limitations of using dot and cross, ball and stick, two and three dimensional diagrams to represent a giant ionic structure ○ Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure. ○ Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. ○ Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding	○ AFL in lessons ○ Targeted questioning ○ Mid Topic assessment ○ End of Topic test	○ Worksheets ○ Flipped learning activities ○ Past exam questions ○ Research ○ Practical write-ups ○ SAM learning ○ Satchel Quizzes	○ **United in harmony** when we consider the wider uses of materials and medicine ○ Polymers and nanoparticles ○ **Grateful** for the beauty of the different types of atoms ○ **Faith-filled and hopeful** when seeing beyond the naked eye ○ **Discerning and joyful** at the possibilities of science and medicine ○ **Leading others in pursuit of justice** when planning and carrying out a practical ○ **Dignity of the human person** when considering healthcare ○ **Courageous and resilient** when we consider how new medicine is discovered and trialled ○ **Dignity of God's people** ○ **Community and participation** ○ **Dignity in work** ○ **Solidarity** ○ **Personal** ○ **Cultural** ○ **Social**	**KS1/2** ○ Changes of state ○ Classifying materials **KS3** Yr 7 ○ Metals and non metals ○ Yr 8 ○ Elements ○ Periodic table ○ Types of reactions **KS4** Yr 9, Yr 11 ○ Organic Chemistry **KS5** Yr 12 Bonding ○ Addition Polymers ○ Yr 13 ○ Condensation polymers

	○ Metallic bonding	○ Recognise common substances that consist of small molecules from their chemical formula. ○ Draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane ○ Represent the covalent bonds in small molecules, in the repeating units of polymers and in part of giant covalent structures, using a line to represent a single bond ○ Describe the limitations of using dot and cross, ball and stick, two and three dimensional diagrams to represent molecules or giant structures ○ Deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule. ○ Recognise substances as giant metallic structures from diagrams showing their bonding ○ visualise and represent 2D and 3D forms including two dimensional representations of 3D objects ○ Predict the states of substances at different temperatures given appropriate data			○ **Art** ○ **History** ○ **Geography** ○ **PE** ○ **Maths** ○ **Physicist** ○ **Engineer** ○ **Material Scientist**	

	○ The three States of matter	○ Explain the different temperatures at which changes of state occur in terms of energy transfers and types of bonding ○ Recognise that atoms themselves do not have the bulk properties of materials ○ (Higher Tier only) Explain the limitations of the particle theory in relation to changes of state when particles are represented by solid spheres which have no forces between them. ○ Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects ○ Include appropriate state symbols in chemical equations for the reactions in this specification. ○ Ionic compounds have regular structures (giant ionic lattices) in which there are strong electrostatic forces of attraction in all directions between oppositely charged ions. ○ Explain why ionic compounds have high melting points and high boiling points ○ Explain why when melted or dissolved in water, ionic compounds conduct electricity .				

	○ How bonding and structure are related to the properties of substances:	○ Use the idea that intermolecular forces are weak compared with covalent bonds to explain the bulk properties of molecular substances.				
	○ Polymers	○ Recognise polymers from diagrams showing their bonding. ○ Describe the nature of forces between the polymer chain and bonds between the atoms in a chain				
	○ Giant structures	○ Recognise giant covalent structures from diagrams showing their bonding and structure ○ Describe and explain the physical properties of giant structures in terms of melting, boiling point ○ Explain the properties of diamond in terms of its structure and bonding. ○ Explain the properties of graphite in terms of its structure and bonding.				

	○ Metals ○ Alloys	○ Know that graphite is similar to metals in that it has delocalised electrons ○ Recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure. ○ Give examples of the uses of fullerenes, including carbon nanotubes. ○ Describe how metals atoms are arranged and how it affects their properties ○ Describe melting points and boiling points of metallic substances. ○ Explain why the melting point and boiling point of metallic substances are high. ○ Explain why metallic substances conduct electricity. ○ Describe the structure of metal alloys. ○ Explain why alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal. ○ Make links between the uses of metal alloys, their properties and structure. ○ Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.				

	○ Properties of ionic compounds	○ Describe how ions are arranged ionic compounds ○ Describe the electrical conductivity of ionic substances. ○ Explain why solid ionic substances do not conduct electricity but dissolved or molten ionic substances do conduct electricity. ○ Explain why ionic compounds have high melting and boiling points ○ Visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects				
	○ Properties of small molecules	○ Use the idea that intermolecular forces are weak compared with covalent bonds to explain the bulk properties of molecular substances. ○ Describe melting points and boiling points of covalent substances. ○ Explain why the melting point and boiling point increases as the size of the molecule does in terms of intermolecular forces. ○ Explain why covalent substances do not conduct electricity				

	○ Giant covalent structures ○ Structure and bonding of carbon ○ Diamond ○ Graphite ○ Graphene and fullerenes	○ Make links between the uses of covalent substances, their properties and structure ○ Explain the properties of diamond in terms of its structure and bonding. ○ Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. ○ Explain properties of graphite in terms of its structure and bonding. ○ Know that graphite is similar to metals in that it has delocalised electrons. ○ Recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure. ○ Give examples of the uses of fullerenes, including carbon nanotubes. ○ Link the properties of graphene to the structure.				
	○ Bulk and surface properties of matter including nanoparticles (chemistry only) ○ Uses of nanoparticles	○ Describe properties and uses of nanoparticles ○ Compare 'nano' dimensions to typical dimensions of atoms and molecules. ○ Explain why nanoparticles have properties different from the bulk material				

		○ Given appropriate information, evaluate the use of nanoparticles for a specified purpose ○ evaluate the use of nanoparticles in applications, eg sun cream ○ Explain that there are possible risks associated with the use of nanoparticles ○ Link the uses of nanoparticles to their ○ properties.				
Spring Term 1						
Spring Term 2						
Summer Term 1						
Summer Term 2						
