Beths Grammar School KS4 Curriculum Map – Year 9 Chemistry

Term	INTENT	IMPLEMENTATION	IMPACT
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	**Disciplinary Knowledge (Skills)** This is the action taken within a particular topic in order to gain substantive knowledge.	**Assessment opportunities** What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Autumn Term Y11 Term 1	Topic C1: Particles C1.1 The particle model Summary This short section introduces the particle model and its explanation of different states of matter. A simple particle model can be used to represent the arrangement of particles in the different states of matter and to explain observations during changes in state. It does not, however, explain why different materials have different properties. This explanation is that the particles themselves and how they are held together must be different in some way. Elements are substances that are made up of only one type of atom and atoms of different elements can combine to make compounds.	**All PAGS time permitting can be done anytime in y9, y10 or y11)** Underlying knowledge and understanding Learners should be familiar with the different states of matter and their properties. Learners should be aware of the energy changes when a change of state occurs. They should also be familiar with changes of state in terms of the particle model. Learners should have sufficient grounding in the particle model to be able to apply it to unfamiliar materials and contexts. Common misconceptions Learners commonly intuitively adhere to the idea that matter is continuous. For example, they believe that the space between gas particles is filled or non-existent, or that particles expand when they are heated. The notion that empty space exists between particles is problematic because these lack sensory evidence. They also show difficulty understanding the concept of changes in state being reversible; this should be addressed during the teaching of this topic.	Written assessments on the history and development of atomic models, quizzes, and classroom discussions. Diagrams and written explanations of atomic structure, lab activities, and end-of-topic tests. Math-based questions, practical measurements, and problem-solving exercises related to atomic and molecular sizes.

	C1.2a: Describe how and why the atomic model has changed over time the models of Dalton, Thomson, Rutherford, Bohr, Geiger and Marsden. **C1.2b**: Describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with most of the mass in the nucleus. **C1.2c**: Recall the typical size (order of magnitude) the concept that typical atomic radii of atoms and small molecules and bond length are in the order of 0–10m. (M1c, M4a, WS1.1c, WS1.4b, WS1.4c, WS1.4d, WS1.4e, WS1.4f) C1.2d: Recall relative charges and approximate relative masses of protons, neutrons, and electrons. **C1.2e**: Calculate numbers of protons, neutrons, and electrons in atoms and ions, given atomic number and mass number of isotopes; definitions of an ion, atomic number, mass number and an isotope; also, the standard notation to represent these. (WS1.3c, WS1.4b)	CM1.1i represent three-dimensional shapes in two dimensions and vice versa when looking at chemical structures, e.g. allotropes of carbon M5b Analysing historical scientific models and understanding the development and refinement of the atomic theory. Creating diagrams of atomic structure, interpreting scientific texts about atomic theory. Applying mathematical concepts to chemistry, understanding measurement scales, and interpreting scientific notation. Construct models and charts showing subatomic particles with their respective charges and masses. Performing calculations, understanding isotope notation, and applying definitions.	Calculation exercises, homework assignments, and written tests focusing on atomic structure and isotope notation. In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of C1 test End of Year assessments

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Autumn Term Y11 Term 2	Summary An atom is the smallest component of an element that gives an element its property. These properties can be explained by models of atomic structure. Current models suggest that atoms are made of smaller sub-atomic particles called protons, neutrons and electrons. They suggest that atoms are composed of a nucleus surrounded by electrons. The nucleus is composed of neutrons and	Underlying knowledge and understanding Learners should be familiar with the simple (Dalton) atomic model. Common misconceptions Learners commonly have difficulty understanding the concept of isotopes due to the fact they think that neutral atoms have the same number of protons and neutrons. They also find it difficult to distinguish between the properties of atoms and molecules. Another common misconception is that a positive ion gains protons or a negative ion loses protons i.e. that there	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson

	protons. Atoms of each element have the same number of protons as electrons. Atoms of different elements have different numbers of protons. Atoms of the same element will have the same number of protons but may have different numbers of neutrons.	is a change in the nucleus of the atom rather than a change in the number of electrons.	
Autumn Term Y11 Term 2	**C1.2 Atomic structure** **C1.2a: Describe how and why the atomic model has changed over time.** The models of Dalton, Thomson, Rutherford, Bohr, Geiger, and Marsden. WS1.1a, WS1.1i, WS1.2b C1.2b describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with most of the mass in the nucleus WS1.4a	Underlying knowledge and understanding Learners should be familiar with the simple (Dalton) atomic model. Explore historical experiments and reasoning leading to changes in the atomic model. Construct a timeline of the atomic model.	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of unit C1 test; To be included in End of Year assessments.

	C1.2c recall the typical size (order of magnitude) of atoms and small molecules the concept that typical atomic radii and bond length are in the order of 10–10m M1c, M4a WS1.1c, WS1.4b, WS1.4c, WS1.4d, WS1.4e, WS1.4f C1.2d recall relative charges and approximate relative masses of protons, neutrons and electrons WS1.4a, WS1.4b, WS1.4c C1.2e calculate numbers of protons, neutrons and electrons in atoms and ions, given atomic number and mass number of Isotopes definitions of an ion, atomic number, mass number and an isotope, also the standard notation to represent these WS1.3c, WS1.4b		

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<u>Spring Term Y11 Term 1</u>	**Topic C2: Elements, compounds and mixtures** **C2.1 Purity and separating mixtures** Summary In chemical terms elements and compounds are pure substances and mixtures are impure substances. Chemically pure substances can be identified using melting point. Many useful materials that we use today are mixtures. There are many methods of separating mixtures including filtration, crystallisation, distillation and chromatographic techniques.	Underlying knowledge and understanding Learners should be familiar with the concept of pure substances. They should have met simple separation techniques of mixtures: filtration, evaporation and distillation. The identification of pure substances in terms of melting point, boiling point and chromatography will also have been met before. Common misconceptions Learners commonly misuse the word pure and confuse it with natural substances or a substance that has not been tampered with. They think that when a substance dissolves that the solution is pure and not a mixture.	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments
		IMPLEMENTATION	**IMPACT**
		Disciplinary Knowledge (Skills)	**Assessment opportunities**

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		This is the action taken within a particular topic in order to gain substantive knowledge.	What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Spring Term Y11 Term 2	C2.1a explain what is meant by the purity of a substance, distinguishing between the scientific and everyday use of the term 'pure' WS1.4a	Purification of compounds. (PAG C4, PAG C7 PAGS time permitting this can be done anytime in y9,y10 or y11)	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery.
	C2.1b use melting point data to distinguish pure from impure substances M1a, M1c, M1d, M2a	Measurement of melting point.	Teacher assessment during lesson
	C2.1c calculate relative formula masses of species separately and in a balanced chemical equation M3b, M3c WS1.3c, WS1.4c	the definition of relative atomic mass, relative molecular mass and relative formula mass	To be included in End of Year assessments In class teacher assessment through Q & A
	C2.1d deduce the empirical formula of a compound from the relative numbers of atoms present or from a model or diagram and vice versa M3b, M3c WS1.1b, WS1.4a		Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery.
	C2.1e explain that many useful materials are formulations of mixtures alloys		Teacher assessment during lesson End of C2.1 test
	C2.1f describe, explain and exemplify the processes of filtration, crystallisation, simple distillation, and fractional distillation WS1.2b,	knowledge of the techniques of filtration, crystallisation, simple distillation and fractional distillation Separation of mixtures and purification of compounds. (PAG C4, PAG C7)	To be included in End of Year assessments

	WS1.2c, WS2a, WS2b C2.1g describe the techniques of paper and thin layer chromatography using aqueous and non-aqueous solvents and locating agents WS1.2b, WS1.2c, WS1.4a, WS2a, WS2b C2.1h recall that chromatography involves a stationary and a mobile phase and that separation depends on the distribution between the phases C2.1i interpret chromatograms, including measuring Rf values M3b, M3c WS1.3c, WS1.4a C2.1j suggest suitable purification techniques given information about the substances involved C2.1k suggest chromatographic methods for distinguishing pure from impure substances WS1.4a	Distillation of mixtures (PAG C4) Paper or thin layer chromatography. (PAG C3) identification of the mobile and stationary phases WS1.4a the recall and the use of the formula paper, thin layer (TLC) and gas Chromatography Using chromatography to identify mixtures of dyes in an unknown ink. (PAG C3)	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of C1 test To be included in End of Year assessments

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Summer Term Y11 Term 1	**C2.2 Bonding** Summary A simple electron energy level model can be used to explain the basic chemical properties of elements. When chemical reactions occur, they can be explained in terms of losing, gaining or sharing of electrons. The ability of an atom to lose, gain or share electrons depends on its atomic structure. Atoms that lose electrons will bond with atoms that gain electrons. Electrons will be transferred between the atoms to form a positive ion and a negative ion. These ions attract one another in what is known as an ionic bond. Atoms that share electrons can bond with other atoms that share electrons to form a molecule. Atoms in these molecules are held together by covalent bonds. C2.2a describe metals and non-metals and explain the differences between them based on their characteristic physical and chemical properties physical properties, formation of ions and common reactions, e.g. with oxygen to form oxides WS1.3f, WS1.4a M5b WS1.1c C2.2a describe metals and non-metals and explain the differences between them on the	Underlying knowledge and understanding Learners should be familiar with the simple (Dalton) atomic model. They should be familiar with the principles underlying the Mendeleev Periodic Table and the modern Periodic Table including periods and groups, and metals and non-metals. Learners should have some knowledge of the properties of metals and non-metals including the chemical properties of metal and non-metal oxides with respect to acidity. Common misconceptions Learners do not always appreciate that the nucleus of an atom does not change when an electron is lost, gained or shared. They also find it difficult to predict the numbers of atoms that must bond to achieve a stable outer level of electrons. Learners think that chemical bonds are physical things made of matter. They also think that pairs of ions such as Na+ and Cl - are molecules. They do not have an awareness of the 3D nature of bonding and therefore the shape of molecules.	Reference Mathematical learning outcomes Mathematical skills CM2.2i þ estimate size and scale of atoms and nanoparticles M1c CM2.2ii represent three-dimensional shapes in two dimensions and vice versa when looking at chemical structures, e.g. allotropes of carbon M5b CM2.2iii translate information between diagrammatic and numerical forms M4a

	basis of their characteristic physical and chemical properties physical properties, formation of ions and common reactions, e.g. with oxygen to form oxides WS1.3f, WS1.4a		In class teacher assessment through Q & A
	C2.2b explain how the atomic structure of metals and non-metals relates to their position in the Periodic Table		Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery.
	C2.2c 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 group number and period number M1c WS1.4a	group number and period number	Teacher assessment during lesson To be included in End of Year assessments
	C2.2d describe and compare the nature and arrangement of chemical bonds in: i. ionic compounds ii. simple molecules iii. giant covalent structures iv. polymers v. metals M5b, M4a WS1.4a Make ball and stick models of molecules.	dot and cross diagrams, ball and stick models and two- and three-dimensional Representations	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of Year Exam
	C2.2e explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons WS1.4a C2.2f construct dot and cross diagrams for simple covalent and binary ionic substances		To be included in End of Year assessments

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	M4a WS1.4a C2.2h explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number WS1.1b, WS1.3f, WS1.4a C2.2i explain in terms of atomic number how Mendeleev's arrangement was refined into the modern Periodic Table WS1.1a,WS1.4a		
Term	**INTENT**	**IMPLEMENTATION**	**IMPACT**
Summer Term 2	**Summary** This section explores the physical properties of elements and compounds and how the nature of their bonding is a factor in their properties. Underlying knowledge and understanding Learners will know the difference between an atom, element and compound.	**Common misconceptions** Learners commonly have a limited understanding of what can happen during chemical reactions, for example substances may explode, burn, contract, expand or change state. Learners commonly have a limited understanding of what can happen during chemical reactions, for example substances may explode, burn, contract, expand or change state. CM2.3i represent three-dimensional shapes in two dimensions and vice versa when looking at chemical structures, e.g. allotropes of carbon	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments In class teacher assessment through Q & A

		M5b CM2.3ii þ relate size and scale of atoms to objects in the physical world M4a CM2.3iii þ estimate size and scale of atoms and nanoparticles M1d CM2.3iv þ interpret, order and calculate with numbers written in standard form when dealing with nanoparticles M1b CM2.3v þ use ratios when considering relative sizes and surface area to volume comparisons M1c CM2.3vi þ calculate surface areas and volumes of cubes M5c	Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments
	C2.3a recall that carbon can form four covalent bonds WS1.4a C2.3b explain that the vast array of natural and synthetic organic compounds occur due to the ability of carbon to form families of similar compounds, chains and rings C2.3c explain the properties of diamond, graphite, fullerenes and graphene in terms of their structures and bonding M5b WS1.4a C2.3d use ideas about energy transfers and the relative strength of chemical bonds and intermolecular forces to explain the different temperatures at which changes of state occur WS1.2a, WS1.3f, WS1.4a, WS1.4c		In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson

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	C2.3e use data to predict states of substances under given conditions C2.3f explain how the bulk properties of materials (ionic compounds; simple molecules; giant covalent structures; polymers and metals) are related to the different types of bonds they contain, their bond strengths in relation to intermolecular forces and the ways in which their bonds are arranged	data such as temperature and how this may be linked to changes of state recognition that the atoms themselves do not have the bulk properties of these materials WS1.4a	
	C2.3g þ compare 'nano' dimensions to typical dimensions of atoms and molecules M4a, M1d, M1b WS1.4c, WS1.4d C2.3h þ describe the surface area to volume relationship for different-sized particles and describe how this affects properties M1c WS1.4c C2.3i þ describe how the properties of nanoparticulate materials are related to their uses M5c WS1.1c, WS1.1e,	Dissolving tablets. (PAG C8)	In class teacher assessment through Q & A Knowledge recall activity Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson To be included in End of Year assessments In class teacher assessment through Q & A Knowledge recall activity

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	WS1.3c, WS1.4a C2.3j þ explain the possible risks associated with some nanoparticulate materials WS1.1d, WS1.1f, WS1.1h, WS1.1i WS1.4a		Homework to develop fluency, problem solving, reasoning and mastery. Teacher assessment during lesson End of C1 test To be included in End of Year assessments
	<u>Week 19</u>		
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			Dr Salem's own written questions from a bank of 600+ Questions and answers are used to provide further help in implementation of objectives relating to topics
	Student Leave		

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Spring Term 2B Year 7			
Summer Term 3A Year 7			

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Summer Term 3B Year 7			
Term		**IMPLEMENTATION**	**IMPACT**
		Disciplinary Knowledge (Skills) This is the action taken within a particular topic in order to gain substantive knowledge.	**Assessment opportunities** What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Autumn Term 1A Year 7	**Intent** Why is this taught now?		
Autumn Term 1B Year 7	**Intent** Why is this taught now?		
Spring Term 2A Year 7	**Intent** Why is this taught now?		
Spring Term 2B Year 7	**Intent** Why is this taught now?		
Summer Term 3A Year 7	**Intent** Why is this taught now?		
Summer Term 3B	**Intent** Why is this taught now?		

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Year 7			
Term	**INTENT**	**IMPLEMENTATION**	**IMPACT**
	Substantive Knowledge This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	**Disciplinary Knowledge (Skills)** This is the action taken within a particular topic in order to gain substantive knowledge.	**Assessment opportunities** What assessments will be used to measure student progress? Evidence of how well students have learned the intended content.
Autumn Term 1A Year 7	**Intent** Why is this taught now?		
Autumn Term 1B Year 7	**Intent** Why is this taught now?		
Spring Term 2A Year 7	**Intent** Why is this taught now?		
Spring Term 2B Year 7	**Intent** Why is this taught now?		
Summer Term 3A Year 7	**Intent** Why is this taught now?		
Summer Term 3B Year 7	**Intent** Why is this taught now?		