Subject: Combined science **Medium term plan Y10 - C2: Elements, compounds and mixtures**

Unit planning and evaluation sheet:

Year group	Subject: (Title of topic)
Prior learning- linked to National curriculum	Learners should be familiar with the concept of pure substances. They should have met simple separation techniques of mixtures. Pupils have covered states of matter. The identification of pure substances in terms of melting point, boiling point and chromatography will also have been met before (in KS3). Learners should be familiar with the atomic model. (C1 content)They will also have a knowledge of how the atomic structure relates to the periodic table. They have also covered ions which will help with the bonding section. Learners will know the difference between an atom, element and compound. (C1 and KS3)
Covid gaps	Pupils have missed a lot of the practicals linked to separation techniques. They will need to be given support completing practicals. This can be done by using the integrated practical instructions and "slow practical" teaching techniques.
Rationale	The C2 module follows on from C1 which looked at atomic structure. C2 builds on their knowledge of atomic structure by linking it to the periodic table and then compounds. Once pupils have a secure knowledge of atomic structure and how it links to the periodic table they are able to look at the different types of bonding. The module then moves onto separating techniques which they have covered at KS3. C2 builds on this basic understanding in KS3 and adds complexity. For example they will have covered chromatography at KS3 but in C2 they go on to calculate RF values. **C2.1 Purity and separating mixtures** 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. **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. 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. **C2.3 Properties of materials** This section explores the physical properties of elements and compounds and how the nature of their bonding is a factor in their properties.
Misconceptions - what are key 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. 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 in order 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. Learners commonly have a limited understanding of what can happen during chemical reactions, for example, that substances may explode, burn, contract, expand or change state.
Vocabulary:	**Keywords** *Alloy* *Empirical Formula* *Relative formula mass*

	Formulation *Pure* *Polymer* *Ionic bonding* *Covalent bonding* *Metallic bonding* *Nanoparticles (triple)*
SEND	Include SENDSational 6 Introducing SENDsational 6
Cultural Capital:	Link to international collaboration to discover new elements and their properties Use of separation techniques in the wider world (e.g. drug testing in sport, producing useful resources) Career opportunities Chemist, pharmaceutical industry, cosmetics, forensics, material science, cooking
Key assessments- name the assessments	*Formative assessments are in the form of long answer tasks. These have statements that pupils are assessed on and then given feedback. They include:* *C2.1b LAT, Chemical purity* *C2.7b PAG write up* *C2.16b LAT Comparing bonding* *Summative assessment* *End of module test followed by feedback lesson.*
What do children know/ can do now (EDSM)	Emerging Students will be able to recall the structure of the atom and recall key terms. They will be able to recall the methods of most separating techniques. In general they will be able to: • demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology • use appropriate mathematical skills to perform multi-step calculations • analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence • evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions. Developing and mastered students will be able to: Identify chemical terms elements, compounds, pure substances and mixtures. Describe how chemically pure substances can be identified using melting point. Give examples of useful mixtures.

	Describe and demonstrate separating mixtures including filtration, crystallisation, distillation and chromatographic techniques. Explain how atomic structure links to the periodic table. Calculate relative formula mass. Describe how chemical bonding occurs in ionic, covalent and metallic substances and give examples of each. Explain how bonding occurs. Link bonding to a substance's properties In general they will be able to: • demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology • use appropriate mathematical skills to perform multi-step calculations • analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence • evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions. Mastered pupils will be able to cover the main points above and be able to make links between them demonstrate relevant and comprehensive knowledge and understanding and apply these correctly to both familiar and unfamiliar contexts using accurate scientific terminology • use a range of mathematical skills to perform complex scientific calculations • critically analyse qualitative and quantitative data to draw logical, well-evidenced conclusions • critically evaluate and refine methodologies, and judge the validity of scientific conclusions. Test marks- **Grade 1 - 10%, Grade 2 = 20%, Grade 3 = 30%, Grade 4 = 40%, Grade 5 = 50%, grade 6= 60%, Grade 7 = 70%, grade 8 = 80%, Grade 9 = 90%**
What **amendments** are you going to make following evaluation of this module?	*New lessons formed to reduce the amount of content covered in each following reduction of lesson time and analysis of end of topic assessments.* *Level assessed tasks added at the mid-way point that summarises learning up to that point.* *Revision and feedback lessons added to either side of the test.* *Exam reflection lesson added to address gaps in knowledge from the module* Flow of lessons doesn't quite work as . This will be changed for