



Atomic structure and Periodic table

KS4 Curriculum Intent:

This unit includes, atomic structure and the history of the atom, elements mixtures and compounds, separation techniques, ions and isotopes, electronic structure. Development of the periodic table, electronic structures and periodic table, Group 1, Group 7 and explaining trends.

Sequence 1:

Lesson 1: Elements, compounds, and mixtures to describe the difference between elements mixtures and compounds.

Lesson 2 Compounds To state the conservation of mass. To compare the properties of the reactants and products in a reaction To be able to write the formula and ratio.

Lesson 3 Balancing Equations To identify numbers of elements and atoms in a formula. To modify symbol equations to make them balanced. **Memory jogger 1**

Lesson 4 Separation techniques to use a variety of separation techniques to separate a mixture, dissolving, filtering, evaporation crystallisation.

Lesson 5 Separation techniques to use a variety of separation techniques to investigate the use of paper chromatography to separate and identify a mixture of colourings.
To describe why fractional distillation is needed to separate some liquids.

Assessment: low stakes testing. Homework (google form)

Sequence 2:

Lesson 6 History of the atom *New (common content with physics)* **Memory jogger 2** To be able to describe and explain how the plum pudding model, changed the atomic model over time. To compare the current accepted atomic model with the plum pudding model.

Lesson 7 Atomic structure to draw and label the parts of an atom, include mass and charge to identify atomic mass and atomic number and know what they represent to calculate atomic mass, number of neutrons.

Lesson 8 Electronic structure to be able to represent electronic arrangements to identify how to find the number of electrons to arrange.

Lesson 9 Memory jogger 3 Isotopes and ions to state what an ion is. To compare atoms and their ions. To know the definition of an isotope.

Lesson 10 The history of the periodic table to be able to describe and explain why the Periodic table has changed throughout the years.

Assessment: low stakes testing. Homework (google form). EOU assessment

Sequence 3:

Lesson 11 Group 1 –the alkali metals to explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms. To describe how the properties of group 1 metals change going down the group. **Memory jogger 3**

Lesson 12 Group 7-the Halogens To describe how group 7 elements behave to describe how the properties of group 7.

Lesson 13 Group 0 To explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms.

In-depth marking- comparing reactivity of group 1 and group 7.

Lesson 14 Revision

Lesson 15 Test

Lesson 16 Reflection and improvement

Assessment: low stakes testing. EOU assessment

Big picture

This unit has several opportunities for practical work, extended writing in response to exam style questions and the embedding of mathematic skills such as standard form and nanometers.

This unit builds on basic knowledge from KS3 whereby students are introduced to simple model of the atom, differences in atoms elements and compounds, using formula and equations metals and non-metals and conservation of mass.

The topic develops further understanding of structure and history of the atom, the periodic table that organizes elements into structures that help us to make sense of the physical world by using atomic structure to explain patterns in reactivity, representing atomic number and atomic mass, estimating the size of atoms using SI units, defining ions and isotopes.

Developing Cultural Capital:

Learning about atomic structure and the periodic table provides opportunities for students to develop their self-knowledge, self-esteem and self-confidence through group and paired work and develop their knowledge of how scientists have shaped understanding of the world. They will also be able to relate science topics to career pathways such as in Medicine, Pharmacy, Beauty therapists and Chemical engineering.

Students will have access to IT to research and further their understanding of this unit and opportunities to make presentations.

Reinforcement and retrieval practice

- All learning sequences are consolidated through a homework, which is reviewed in the next sequence to Space Learning.
- 'Memory joggers' are formally completed as the Do Now, these will be evidenced in the student's books.
- AfL is used regularly to evidence gaps in knowledge and inform planning so that learning is consolidated before being moved on.
- Regular questioning is embedded in all lessons and should be a key feature on learning walks.

Progression Model:

- Students will build on and develop practical skills within this topic that will link into further units within science as well as an understanding of the fundamental aspects of Chemistry that allow the higher-level learning to occur later in the GCSE.
- The learning will be revisited throughout the KS4 course through cumulative assessments and memory joggers.
- Also, their metacognitive skills will improve as they use self-assessment, low stakes testing, memory joggers and responding to teacher's feedback to take control of their own learning.



Bonding structures and Properties

KS4 Curriculum Intent:

This unit includes states of matter, ions and ionic bonding, covalent bonding, simple molecules and giant ionic and covalent structures, bonding in metals and giant metallic structures.

Sequence 1:

Lesson 1: States of matter to describe the properties of matter in a solid, liquid and gas. To explain change of state. To discuss the limitations of the simple particle model.

Lesson 2: Ionic bonding. To recall how atoms become ions. To describe and explain ionic bonding and represent this with dot cross diagrams.

Lesson 3 Giant ionic compounds: To describe and explain the properties of giant ionic structures and relate them to their properties.

Lesson 4 Covalent bonding: To describe and explain covalent bonding and represent this as dot cross diagram.

Lesson 5 Simple structures: To describe and explain the properties of simple structures and relate them to their properties.

Lesson 6 in-depth marking- comparing ionic and covalent structures and consolidation.

Lesson 7: Giant covalent structures: To compare the properties of diamond to graphite and explain these properties.

Lesson 8. Fullerenes and graphene: To describe and compare the structure properties and uses of graphene, fullerenes, and nanotubes.

Assessment: low stakes testing. Homework (google form)

Sequence 2:

Lesson 9 Bonding and properties of metals: To describe metallic bonding. To state why metals are good conductors of heat and electricity. **Lesson can be used to review the three types of bonding.**

Lesson 10 Metals and alloys: To compare the structure of a pure metal to an alloy. To investigate the properties of alloys

Lesson 11 Polymers: To recognise polymers from diagrams showing their bonding and structure. To know that polymers are linked to other atoms by strong covalent bonds.

Assessment: low stakes testing. EOU test.

Sequence 3:

Lesson 12 Revision
Lesson 13 Assessment
Lesson 14 Reflection and improvement

Big picture

This unit has several opportunities for practical work, extended writing in response to exam style questions and the embedding of mathematic skills such as standard form and nanometers.

This unit builds on basic knowledge from KS3 whereby students are introduced to simple model of the atom, differences in atoms elements and compounds, using formula and equations metals and non-metals and conservation of mass.

The topic develops further understanding of how atoms bond in elements and compounds, explaining the formula of elements and compounds knowing the, structure of the atom and type of bond involved, to explain differences in metals and non-metals in terms their atomic structure and bonding.

Developing Cultural Capital:

This unit provides opportunities for students to develop their self-knowledge, self-esteem and self-confidence through group and paired work and develop their knowledge of how scientists have shaped understanding of the world. They are also able to relate topics in science to future career paths Chemical engineering, Pharmacy, and careers in Medicine.

Students will have access to IT to research and further their understanding of this unit and opportunities to make presentations.

Reinforcement and retrieval practice

- All learning sequences are consolidated through a homework, which is reviewed in the next sequence to Space Learning.
- 'Memory joggers' are formally completed as the Do Now, these will be evidenced in the student's books.
- AfL is used regularly to evidence gaps in knowledge and inform planning so that learning is consolidated before being moved on.
- Regular questioning is embedded in all lessons and should be a key feature on learning walks.
- End of unit assessment will be cumulative involving questions from previous units.

Progression Model:

- Students will build on and develop practical skills within this topic that will link into further units within science as well as an understanding of the fundamental aspects of Chemistry that allow the higher-level learning to occur later in the GCSE.
- The learning will be revisited throughout the KS4 course through cumulative assessments and memory joggers.
- Also, their metacognitive skills will improve as they use self-assessment, low stakes testing, memory joggers and responding to teacher's feedback to take control of their own learning.