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Chemistry Scheme of Learning

Year 9 – Term 1 – C1: Atomic Structure

Intent – Rationale

Students are introduced to the fundamentals of chemistry, including basic vocabulary, the basic structure of an atom, and form of chemical equations. Stud techniques, such as filtration, evaporation, distillation, and chromatography. Students are given the opportunity to develop their scientific judgement and mixtures of substances. Isotopes and ions are introduced in the context of changes in the number of neutrons and electrons respectively. Students are famili and placing electrons in shells.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 7 Topic 1 Particles • Year 7 Topic 2 Atoms and Elements. • Year 7 Topic 5 Simple chemical reactions • Year 7 Topic 6 Compounds • Year 8 Topic 8 Periodic Table	• Second half of C1 (Term 2) The Periodic Table • C2 Structure and bonding • C4 Chemical changes • C4 Electrolysis • C7 Crude oil • C8 Chemical analysis
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work	• GB4a Group work for history of the atomic model • GB4i Building a model of an atom • GB4g Practical work in groups of 2-4.

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What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
FROM THE LIBRARY *The Elements;* Dan green-546 *Periodic Table;* Brian Knapp-546 *Chemistry in a Social and Historical Context*; D. Warren-540 *Elephants on Acid and other Bizarre Experiments*; Alex Boese-500 *Chemicals in Action-Acids and Bases*; Chris Oxlade-546 *Chemicals in Action-ATOMS*; Chris Oxlade-541.24 *Chemicals in Action-Materials Changes and Reactions*- 541.39	• Calculation of R_f values in chromatography.

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Chemistry Scheme of Learning

Year 9 – Term 1

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- Recognise that elements are made from only one type of particle, known as atom, which is the smallest part of an element.
- Describe what a mixture is.
- Recall the different charges on the particles that make up an atom.
- Understand that atoms of the same elements can have different numbers of neutrons, that these are called isotopes of that element.
- Understand that atoms of the same element can have different numbers of electrons, that are called ions.
- Describe how the atomic model has changed over time.

Apply

- Recall the symbols of the first 20 elements in the Periodic Table, the elements in Groups 1 and 7, and other elements in the specification.
- Describe, explain, and give examples of specified processes of separation.
- Recall what atomic number represents.
- Describe why atoms have no overall charge.
- Describe why the atomic model has changed over time.
- Describe the difference between the Plum Pudding model of the atom and the nuclear model of the atom.

Extend

- Name the first 20 elements in the Periodic Table, the elements in Groups 1 and 7, and other elements from their symbols.
- Write balanced symbol equations to represent chemical reactions.

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- Suggest suitable separation and purification techniques for mixtures when given appropriate information.
- Describe and explain the separation process in fractional distillation.
- Describe and explain the separation process in chromatography.
- Calculate the number of protons, neutrons, and electrons in an atom or ion, given its atomic number and mass number.
- Draw the electronic structure of the first 20 elements of the Periodic Table.
- Describe why the new evidence from the scattering experiment led to change in the atomic model.

What subject specific language will be used and developed in this topic?

Word	**Definition**
Atom	The smallest particle that takes part in a chemical reaction
Element	Only contain 1 type of atom
Compound	2 or more elements chemically bonded together
Mixture	To or more different substances not chemically bonded together
Reactants	Elements or compounds that react together

What opportunities are available for assessing the progress of students?

- Long answer question – Atomic structure
- Long answer question – Periodic table Group 1
- Quiz (after lesson 5)
- Summative test after lesson 7

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Products	What is made during a chemical reaction
Chemical reaction	What happens when reactants make products
Distillation	Separating a liquid from a mixture using evaporation and condensation
Fractional distillation	Separating mixtures using their different boiling points
Condenser	Apparatus that cools down a vapour to a liquid
Filtration	Separating a solid from a liquid
Filtrate	The solution that passes through the filter paper
Crystallisation	Forming crystals from a solution
Chromatography	Separating pigments from a mixture
Solubility	How easily a substance dissolves
Electron	The particle that orbits the nucleus in an atom

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Proton	Positive particles found in the nucleus of an atom
Neutron	Neutral particles found in the nucleus of an atom
Nucleus	The centre of an atom containing the protons and neutrons
Isotope	Atoms of the same element with a different number of neutrons
Ion	A charged atom (formed by losing or gaining electrons)
Plum-pudding model	Model of an atom that is made of positive material and negative electrons like the currents in a pudding
Nuclear model	The model of an atom with most of the mass in the centre.
Mass number	The number of particles in the nucleus
Atomic number	The number of protons in the nucleus
Periodic table	All the known elements arranged in proton number
Period	The row of elements in the periodic table

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Group	A column of elements in the Periodic Table
Electronic structure	Arrangement of elements in an atom
Density	Mass per unit volume
Alkali metals	Group 1 elements
Displacement	When a more reactive element pushes out a less reactive element
Halogen	Group 7 elements
Halide	Group 7 ions (that are found in compounds with group 7 elements)
Transition metal	Found in the centre of the periodic table
Catalyst	Speeds up a chemical reaction.

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
Topic 1 Lesson 1 – Atoms and elements	Can I recognise that elements are made from only one type of particle, known as an atom, which is the smallest part of an element? Can I recall the symbols for the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements within the specification?	Can I name the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements from their symbols? Can I write balanced symbol equations to represent chemical reactions?	
Topic 1 Lesson 2 – Separating salt from water	Can I describe what a mixture is? Can I describe, explain, and give examples of specified processes of separation?	Can I suggest suitable separation and purification techniques for mixtures when given appropriate information?	
Topic 1 Lesson 3 – Fractional Distillation	Can I recall what a mixture is?	Can I describe and explain the separation process in fractional distillation?	

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Topic 1 Lesson 4 – Chromatography	Can I recall what a mixture is?	Can I describe and explain the separation process in chromatography?	
Topic 1 Lesson 5 – The structure of the atom	Can I recall the different charges on the particles that make up an atom? Can I recall what atomic number represents? Can I describe why atoms have no overall charge?	Can I calculate the number of protons, neutrons, and electrons in an atom or ion, given its atomic number and mass number (for the first 20 elements)? Can I draw the electronic structure of the first 20 elements of the Periodic Table?	
Topic 1 Lesson 6 – Atoms, ions and isotopes	Can I understand that atoms of the same element can have different numbers of neutrons, that these atoms are called isotopes of that element? Can I understand that atoms of the same element can have different numbers of electrons, that these are called ions?	Can I calculate the number of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number?	

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Topic 1 Lesson 7 – History of the development of the atom	Can I describe how and why the atomic model has changed over time? Can I describe the difference between the Plum Pudding model of the atom and the nuclear model of the atom?	Can I describe why the new evidence from the scattering experiment led to change in the atomic model?	
Revision for summative test			
Summative test			