

YEAR 9 CURRICULUM INFORMATION – Chemistry

Summer 1

Summer 2

What will students be learning?

Structure and Bonding

Students will learn about the different types of bonding in substances. They should know that covalent bonding is the sharing of one or more pairs of electrons between non-metal atoms; ionic bonding involves a metal and non-metal atom, with the metal atom losing one or more electrons and the non-metal atom gaining one or more electron; and metallic bonding involves a delocalised sea of electrons surrounding the positive metal ions.

Students will also learn how the bonding of a substance affects its bulk properties. They should be able to describe the difference in bonding and properties of giant ionic structures, simple covalent molecules, and giant covalent structures (including different arrangements of carbon). Students should understand that covalent, metallic, and ionic bonding is strong, but that it is how the particles interact (intermolecular forces) that determines properties such as melting point, boiling point, and electrical conductivity.

Finally, students should learn about nanoparticles, their properties, and be able to explain how the surface area to volume ratio of nanoparticles is different to bulk material, and how this affects their uses.

The Earth's atmosphere

Students will learn about the Earth's atmosphere. Students need to be able to describe the volcanic activity theory of the origin of the atmosphere, but they should be able to interpret evidence concerning other theories, and be able to evaluate them. To describe the history of the atmosphere students will need to have a sense of the timescales involved.

Along with an understanding of the origins of the atmosphere, students should also understand how it has evolved over time. This includes both how the general composition of the atmosphere has changed and how the atmosphere is currently being affect by human activity. Students should be able to describe the human activities that are thought to cause global warming, and be able to explain some of the effects this has on the climate of the Earth. Students should also be able to explain the effect of other pollutants on the Earth, including carbon monoxide, sulfur dioxide, nitrogen oxides, and particulates.

Chemical analysis

Students will learn about various techniques for analysing substances. All students should understand the difference between a pure substance, a mixture, and a formulation, and what is meant by purity. Students should also have built upon their understanding of chromatography experiments from *C1 Atomic Structure* and be able to analyse a chromatogram, both qualitatively and quantitatively using *R_f* values. Students should also be able to describe the different experimental tests for gases, including both the procedure and positive result. Students should also be able to describe experimental tests for positive and negative ions, and be able to write balanced symbol equations for them. They should be able to apply their knowledge of all of the tests they have learnt to be able to plan and investigation to identify positive and negative ions. Students will also study flame emission spectroscopy, and should be able to interpret instrumental results.

How will students be assessed?









C3 (Structure and bonding) Milestone

C13 (The Earth's atmosphere) Milestone

C12 (Chemical analysis) Milestone

Required practical – Paper chromatography

Required practical – Use of chemical tests to identify the ions in unknown single ions compounds

<p>Literacy – What keywords will be taught?</p>	<p>Kinetic, Covalent, Ionic, Ion, Lattice, Electrostatic, Intermolecular forces, Alloy, Nanoparticles, Catalyst</p>	<p>Air, Oxygen, Carbon dioxide, Nitrogen, Sulfur dioxide, Volcanoes, Particulates, Ammonia, Acid rain, Photosynthesis, Global dimming, Combustion, Greenhouse effect, Global warming, Carbon monoxide, Nitrogen oxide</p> <p>Pure, Impure, Mixture, Formulation, Component, Chromatogram, Mobile phase, Stationary phase, Retention factor, Solvent, Solute, Substance, Glowing, Burning, Compound, Flame, Precipitate, Solution, Dissolve, Spectroscopy</p>
<p>What employability skills are being developed?</p>	<p>Skills such as investigative and analytical which can lead to careers as: Analytical technician, nanotoxicologist, Marketing development manager</p>	<p>Skills such as investigative and analytical which can lead to careers as: Atmospheric Scientists, Meteorologists, National Weather Service, Climate change, Environmentalist, Climatologist, Renewable Energy Geoscientist, Environmental Lawyer, Climatologist, Renewable Energy Scientist, Geoscientist, Clean Car Engineer, Chemical manufacturer, Chemical engineer, Criminal analyst, Pharmacologist, Toxicologist, Crime scene investigator</p>
<p>Wider Curriculum Links?</p>	<p>History of the atom History of the Periodic Table History of Scientists and their discoveries DT Materials and their properties</p>	<p>Geography (Earth composition) Biology (Photosynthesis) Geography (Pollution)</p> <p>Food (Use of food colouring dyes) Food (Use of E numbers in food) Maths (Interpreting data)</p>
<p>What useful websites are there for this topic?</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Free science lessons </div> <div style="text-align: center;">  Primrose Kitten </div> <div style="text-align: center;">  Seneca </div> <div style="text-align: center;">  BBC Bitesize </div> </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Free science lessons </div> <div style="text-align: center;">  Primrose Kitten </div> <div style="text-align: center;">  Seneca </div> <div style="text-align: center;">  BBC Bitesize </div> </div>

<p>What wider reading could be done for this topic?</p>	<p>Textbooks: AQA Chemistry for GCSE Combined Science: Trilogy (Oxford) Textbooks: AQA Chemistry for GCSE Separate Science</p>	<p>Textbooks: AQA Chemistry for GCSE Combined Science: Trilogy (Oxford) Textbooks: AQA Chemistry for GCSE Separate Science (Oxford)</p>
<p>What else can students be doing independently to develop their understanding of this topic?</p>	<p>Exam questions Numeracy practice</p>	<p>Exam questions Numeracy practice Timescales</p>