

**Autumn Term: 2024**

4.4: Chemical Analysis:

**4.8.1 Purity, formulation and chromatography**

4.8.1.1 Pure substances

4.8.1.2 Formulations

4.8.1.3 Chromatography

**4.8.2 Identification of common gases**

4.8.2.1 Test for hydrogen

4.8.2.2 Test for Oxygen

4.8.2.3 Test for Carbon dioxide

4.8.2.1 Test for Chlorine

**4.8.3 Identification of ions by chemical and spectroscopic means)**

4.8.3.1 Flame test

4.8.3.2 Metal hydroxide

4.8.3.3 Carbonates

4.8.3.4 Halides

4.8.3.5 Sulphates

4.8.3.6 Instrumental methods

4.8.3.7 Flame emission spectroscopy

**4.7 Organic chemistry**

**4.7.1 Carbon compounds as fuels and feedstock**

4.7.1.1 Crude oil, hydrocarbons and alkanes

4.7.1.2 Fractional distillation and petrochemicals

4.7.1.3 Properties of hydrocarbons

4.7.1.4 Cracking and alkenes

**4.7.2 Reactions of alkenes and alcohols (chemistry only)**

4.7.2.1 Structure and formulae of alkenes

4.7.2.2 Reactions of alkenes

4.7.2.3 Alcohols

4.7.2.4 Carboxylic acids

**4.7.3 Synthetic and naturally occurring polymers (chemistry only)**

4.7.3.1 Addition polymerisation

4.7.3.2 Condensation polymerisation (HT only)

4.7.3.3 Amino acids (HT only)

4.7.3.4 DNA (deoxyribonucleic acid) and other naturally occurring polymers

**Christmas Half term**

## Spring Term - 2025

### **4.9 Chemistry of the atmosphere**

#### **4.9.1 The composition and evolution of the Earth's atmosphere**

4.9.1.1 The proportions of different gases in the atmosphere

4.9.1.2 The Earth's early atmosphere

4.9.1.3 How oxygen increased

4.9.1.4 How carbon dioxide decreased

#### **4.9.2 Carbon dioxide and methane as greenhouse gases**

4.9.2.1 Greenhouse gases

4.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

4.9.2.3 Global climate change

4.9.2.4 The carbon footprint and its reduction

#### **4.9.3 Common atmospheric pollutants and their sources**

4.9.3.1 Atmospheric pollutants from fuels

4.9.3.2 Properties and effects of atmospheric pollutants

### **4.10 Using resources**

#### **4.10.1 Using the Earth's resources and obtaining potable water**

4.10.1.1 Using the Earth's resources and sustainable development

4.10.1.2 Potable water

4.10.1.3 Waste water treatment

4.10.1.4 Alternative methods of extracting metals (HT only)

#### **4.10.2 Life cycle assessment and recycling**

4.10.2.1 Life cycle assessment

4.10.2.2 Ways of reducing the use of resources

#### **4.10.3 Using materials (chemistry only)**

4.10.3.1 Corrosion and its prevention

4.10.3.2 Alloys as useful materials

4.10.3.3 Ceramics, polymers and composites

#### **4.10.4 The Haber process and the use of NPK fertilisers (chemistry only)**

4.10.4.1 The Haber process

4.10.4.2 Production and uses of NPK fertilisers

*Half term*

*Easter half term*

## **Curriculum Intent and Implementation**

### **Vision:**

Our vision here in the Chemistry department is to inspire and equip students with the knowledge, skills, and enthusiasm necessary to understand and apply chemical principles through hands-on experiments, fostering a deeper appreciation of the scientific method and its impact on the world around us.

### **Mission:**

Our mission is to provide a stimulating and supportive learning environment where students can develop their practical chemistry skills, critical thinking, and scientific literacy. We aim to cultivate curiosity, innovation, and a lifelong passion for science through engaging and meaningful laboratory experiences. Through our practical chemistry curriculum, we aim to nurture inquisitive minds, develop competent and confident individuals, and inspire the next generation of scientists.

### **Goals:**

Develop Scientific skills:

We work hard to ensure that all students are helped to acquire essential laboratory techniques and safety practices, promote precision, accuracy, and develop attention to detail in experimental work, whilst developing independent and collaborative problem-solving abilities.

Enhance Scientific Understanding

- All students are helped to reinforce their theoretical knowledge through practical application.
- Teachers must foster an understanding of the scientific method, including hypothesis formulation, experimental design, data collection, and analysis.
- Students are helped to see the relevance of chemistry in everyday life and its applications in various fields such as medicine, industry, and environmental science.

### **Promote Inquiry and Critical Thinking:**

Teachers at Brook sixth form stimulate curiosity and questioning, encourage students to analyse and interpret data, draw conclusions, and communicate findings effectively. Through class discussions, students are helped to develop the ability to critically evaluate scientific information and experimental outcomes.

### **Cultivate a Safe and Supportive Learning Environment:**

Here in the chemistry department, we understand the importance of safety and we take on the challenge to ensure all students understand and adhere to safety protocols. The science team provides equal opportunities for all students to participate and succeed in laboratory activities. We celebrate and welcome the diversity of our students, hence foster a collaborative and respectful atmosphere that supports diverse learning needs and styles.

### **Prepare our students for Future Endeavours:**

Here in the Chemistry department, we know that transferable skills are critical for science students as they equip them with versatile abilities that are valuable across various professional and academic fields. Whatever, endeavours our students may pursue in their future careers, we equip them with the skills and confidence needed for higher education and careers in science and related fields.

As a team, we aim at developing them into lifelong learners with the ability to adapt in an ever-changing scientific landscape. In addition, we encourage ethical and responsible conduct in scientific practice.

### **Implementation:**

#### **Constructive learning:**

We understand the need to place the learner in the centre of their learning journey. Therefore, the department adopt and implement the constructive learning approach in our lessons, enabling learners actively construct their own understanding and knowledge through experiences and reflecting on those experiences. We therefore emphasise of hands-on activities, critical thinking, and collaboration, allowing students to connect new information to prior knowledge and apply it in meaningful ways and ultimately take responsibility for their learning.

#### **Structured Curriculum:**

A well-organized **sequence** of practical activities aligned with theoretical lessons, progressing from fundamental techniques to more complex experiment, helping our students build upon previous learning. We work collaboratively at helping our learner link ideas across different areas of the curriculum.

#### **Resources and Support:**

We adapt learning to the very needs of individual students in order to help them reach their potential. In addition, we provide appropriate materials, equipment, and guidance to facilitate effective learning experiences.

#### **Assessment and Feedback:**

We aim at developing our students into reflective learners, through regular formative and summative assessments to monitor progress, identify areas for improvement, and provide constructive feedback.

## Unit 4.4: Chemical change

Afl strategies:	Retrieval :	Inclusivity and Differentiations:
<p><b>Afl strategies:</b> Low/high stake Quizzes, Targeted Questioning, Peer Talk and responses Peer Assessment &amp; Self-Assessment, Thumb signs pose-pause –pounce, exit and self-peer assessment etc.</p>	<p><b>Retrieval:</b> Starter- Retrieval at the start of each lesson/ Quizzes to retrieve previous knowledge/ opportunities in the lesson to link new knowledge to previous knowledge.</p> <p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>○ Spaced retrieval (to combats the forgetting curve)</li> <li>○ Retrieval mats/grids</li> <li>○ Draw it !..label it!</li> <li>○ Free recall Concept mapping</li> <li>○ Peer teaching</li> </ul>	<p><b>Inclusivity and Differentiations:</b> To ensure we provide a supportive environment and meet the individual learning needs of our SEND students we adopt the following strategies in our science lessons:</p> <ul style="list-style-type: none"> <li>○ Chunk information into manageable bite sized tasks</li> <li>○ Provide Visual /multisensory aids to help students develop understanding</li> <li>○ Provide tiered activities/HW that allows all learners to make progress at their own pace</li> <li>○ Flexible groupings to provide effective collaboration</li> <li>○ Provide text that caters to the reading ages of individual learners</li> </ul> <p><i>SEND support (K) and EHCP (E= stated) – for pupils with IEPs targets in their pupil past-ports are used to inform planning</i></p>
<p><b>Previous learning:</b></p> <ul style="list-style-type: none"> <li>○ Particle model of matter</li> <li>○ Elements-compounds</li> <li>○ Writing word and symbol equation</li> <li>○ Knowledge of Periodic table</li> <li>○ Knowledge of bonding</li> <li>○ Knowledge of acid and alkali (ks3)</li> <li>○ Conservation of mass/stoichiometry</li> </ul>		
Literacy in Chemistry:	Reflection:	Numeracy Skills:
<ol style="list-style-type: none"> <li>1. <b>Response to six markers (two-week cycle)</b> <ul style="list-style-type: none"> <li>○ Teacher provide detailed feedback to a six marker response with focus on; <b>content</b>, use of <b>key terms</b>, <b>SPAG</b>, <b>presentation</b>, <b>command words</b> and <b>coherence</b>, <b>logical reasoning</b></li> <li>○ Student respond and improve their work</li> </ul> </li> <li>2. <b>Frayers model</b></li> <li>3. Writing descriptions/observation during experiments</li> <li>4. Lesson <b>key terms</b> provided during lessons</li> <li>5. Claim –Evidence –Reasoning</li> <li>6. <b>Read</b> and <b>translate</b> information into other formats</li> </ol>	<p>Students are encouraged to reflect and to evaluate their own and others' which work fosters reflective learning and helps them understand how to improve. The following strategies are employed:</p> <ul style="list-style-type: none"> <li>○ Peer on peer/self-assessment during lesson</li> <li>○ Teacher feedback and student respond to improve</li> <li>○ End of unit/end of topic assessments are used to help student reflect and improve</li> </ul>	<p><b>Experimental skills:</b> Practical sessions are used to develop the following skills:</p> <ul style="list-style-type: none"> <li>○ Choosing appropriate graph, identifying variables and controls</li> <li>○ Collecting and Recording data, interpreting and describing trends and drawing conclusions</li> <li>○ Observing safety protocols and setting up apparatus safely</li> <li>○ Carrying out repeats, testing reliability of test data and identifying anomalous data</li> <li>○ Drawing conclusions</li> <li>○ Calculating averages/mean</li> </ul>

Week	Lesson Objectives	Activities	Assessment opportunities (Afl)	Links to Previous Learning	Skill development	Required Practical Other practical
Week 1: Reactivity and REDOX						
<b>03/09/24</b> <b>To</b> <b>08/09/24</b>  <b>Lesson 1</b> The reactivity Series 4.4.1.2	-I can describe the reaction between metal and oxygen -I can recall the order of the reactivity series -I can describe when a displacement reaction might take place  -I can use experimental data to work out the order of reactivity  Explain the order of the reactivity series based on observations	<b>Activity:</b> A teacher-led demonstration comparing how different metals react with water, acid, and oxygen.  Student Investigate the reactions of metals with acids.  Students write word and symbol chemical equations predicting products of reactions using reactivity series  <b>(MA –create and write balanced symbol equation)</b>  Card Sort Activity: Metal Reactivity Series	Quizzes, peer/self-assessment	Knowledge of periodic table, atomic structure and stoichiometry	Observations and recording data	
<b>Lesson 2 –</b> Oxidation and Reduction 4.4.1.1	- I can describe oxidation as the loss of electrons -I can describe reductions a gain of electrons -I can write balanced ionic half equations -I can determine which element in a reaction is oxidised or reduced from the equation	Students are provided with equations and they identify oxidation in terms of loss and gain of oxygen <b>Teacher lead</b> – explanation the rules for writing half equation Students write half equations and identify oxidised and reduced species in terms of electrons loss/gain <b>Homework:</b> Complete exam-style questions on redox reactions.	Targeted questioning Peer assessment	Knowledge of Bonding and Making ions	Math skills: Stoichiometry Rations/	

Week 2: Metal extraction					
<p>09/09/24 To 15/09/24</p> <p>Lesson 3 – Extraction of Metals</p> <p>4.4.1.4 (HT only)</p>	<p>-I can describe how unreactive metals are found in the Earth</p> <p>-I can describe reduction</p> <p>-I can describe the process of extracting aluminium by electrolysis</p> <p>- Understand how metals are extracted from ores (e.g., reduction of ores with carbon).</p> <p>- Explain why some metals are found uncombined in nature.</p>	<p>Practical demonstration: Carbon reduction of copper oxide.</p> <p>Watch video: How modern methods extract metals (e.g., electrolysis for aluminium).</p> <p>Given reactivity series, students predict with reasoning how the metals could be extracted from their ores</p> <p>Homework: Write a report on the environmental impact of metal extraction.</p>	<p>Quizzes</p> <p>Targeted questions</p> <p>Peer/self-assessment</p>	<p>Reactivity series</p> <p>Knowledge of how group 1 metals react</p>	<p>Describing trend</p>
<p>Lesson 4 – Introduction to acids, Alkali and bases</p> <p>4.4.2.1</p>	<p>Understand the difference between acids and alkalis.</p> <p>Learn how to use <b>indicators</b>, such as litmus paper and the pH scale, to classify substances as acidic, neutral, or alkaline.</p>	<ul style="list-style-type: none"> <li>○ Practical: Testing household substances with indicators.</li> <li>○ Given key terms, students write their definition of acids and alkali</li> <li>○ Group discussion on real-world examples of acids and alkalis.</li> <li>○ Evaluate the use of different indicators</li> </ul>	<p>Quizzes</p> <p>Targeted questions</p> <p>Peer/self-assessment</p>	<p>Knowledge of pH scale from Ks3</p>	<p>Recording observing observations</p> <p>Literacy – use of keyterms</p> <p>Evaluative skills</p>
Week 3 – How acids react					
<p>16/09/24 To 23/09/24</p> <p>Lesson 5 – Reactions with Acids</p>	<p>-I can use the general equation to predict the products from a reaction</p> <p>-I can determine the formula of a salt from common ions</p>	<p>Teacher present rule on how to write the names of salts</p> <p>Students complete word equations predicting the products of chemical reaction</p>		<p>Stoichiometry</p>	

Lesson 6 – Neutralisation 4.4.2.2	I can describe the ions that lead to acidic and alkaline conditions -I can use the pH scale to describe how acidic or alkaline a solution is -I can use an equation to show neutralisation					
Week 4 - Required practical	Making soluble salt 4.4.2.3					
<b>23/09/24</b> <b>To</b> <b>29/09/24</b> <b>Lesson 7</b> - The Concentration of a Solution	I can calculate the <b>concentration</b> of a solution in mol/dm <sup>3</sup> -I can carry out titration calculations				Numeracy	
Lesson 8 (RP) – Titration 4.4.2.5	-I can carry out a titration -I can calculate a concentration from titration data				<ul style="list-style-type: none"> <li>○ Error analysis</li> <li>○ Attention to detail</li> <li>○ Precision and accuracy</li> </ul>	RP titration
<b>Lesson 9</b> (RP) – Making soluble salt	-I can describe how to make a pure salt				Organisational skill Safety and risk management	RP – making salt
Week 5 – Types of acids and Electrolysis -						
<b>30/09/24</b> <b>To</b> <b>06/10/24</b> <b>Lesson 8</b> – pH scale - Strong and weak acids  4.4.2.4  4.4.3.4	-I can give examples of strong and weak acids -I can describe how concentration relates to pH  -I can use the terms strong, weak, concentrated and dilute in term of acids  Required practical – Electrolysis	Demonstration: Diluting acids and observing their reactions.  Graph interpretation of pH changes.  Homework: Worksheet on identifying strong and weak acids.  Activities:			Pattern recognition Interpreting trends	

		<p>Practical: Metal + acid reactions (magnesium, zinc, copper, etc.).</p> <p>Video analysis: The reactivity series.</p>				
Lesson 9 – Electrolysis 4.4.3.1	<p>-I can explain why compounds need to be <b>molten</b> or dissolved to conduct</p> <p>-I can describe the movement of ions during electrolysis</p> <p>- I can predict the products of electrolysis</p> <p>-I can write <b>balanced half equations</b> to describe what happens at each electrode</p>					
Week 6 – Required practical and revision						
<p>07/10/24 To 13/10/24</p> <p>Lesson 10 (RP)– Electrolysis 4.4.3.2</p>	<p>-I can describe how to test for the production of <b>chlorine gas</b></p> <p>-I can describe how to test for the production of <b>hydrogen gas</b></p> <p>-I can describe how to test for the production of <b>oxygen gas</b></p> <p>-I can describe what happens to aqueous solutions that are electrolysed</p> <p>I can write <b>half equations</b> of what happens at the <b>cathode</b> and <b>anode</b></p>	<p>Activities:</p> <p>Practical: Electrolysis of CuSO<sub>4</sub> solution</p> <p>Group discussion on industrial electrolysis (e.g., aluminium extraction).</p> <p>Homework: Case study: The role of electrolysis in the production of metals.</p>				RP – Electrolysis
<p>14/10/24 to 20/10/24</p> <p>Week 7: Lesson 11: Revision – Retrieval Lesson 12: Buffer</p>						
<p>Week 8: 21/10/24 to 24/10/24</p>	<p>Assess students' understanding of the entire unit.</p>					

Lesson 13: End of Unit Test	Activities: End-of-unit test covering acids, metal reactions, electrolysis, and redox reactions. Homework: Review test results and self-assess.					
Lesson 14: Feedback and Revision	Identify areas of weakness and clarify misunderstandings. Review key points for improvement. Activities: Individual feedback sessions. Group revision activities based on common errors in the test.					

## 4.7 Organic chemistry

Afl strategies:	Retrieval :	Inclusivity and Differentiations:
<p><b>Afl strategies:</b> Low/high stake Quizzes, Targeted Questioning, Peer Talk and responses Peer Assessment &amp; Self-Assessment, Thumb signs pose-pause –pounce, exit and self-peer assessment etc.</p>	<p><b>Retrieval:</b> Starter- Retrieval at the start of each lesson/ Quizzes to retrieve previous knowledge/ opportunities in the lesson to link new knowledge to previous knowledge.</p> <p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>○ Spaced retrieval (to combats the forgetting curve)</li> <li>○ Retrieval mats/grids</li> <li>○ Draw it !..label it!</li> <li>○ Free recall Concept mapping</li> <li>○ Peer teaching</li> </ul>	<p><b>Inclusivity and Differentiations:</b> To ensure we provide a supportive environment and meet the individual learning needs of our SEND students we adopt the following strategies in our science lessons:</p> <ul style="list-style-type: none"> <li>○ Chunk information into manageable bite sized tasks</li> <li>○ Provide Visual /multisensory aids to help students develop understanding</li> <li>○ Provide tiered activities/HW that allows all learners to make progress at their own pace</li> <li>○ Flexible groupings to provide effective collaboration</li> <li>○ Provide text that caters to the reading ages of individual learners</li> </ul> <p><i>SEND support (K) and EHCP (E= stated) – for pupils with IEPs targets in their pupil past-ports are used to inform planning</i></p>
<p><b>Previous learning:</b></p> <ul style="list-style-type: none"> <li>○ Particle model of matter</li> <li>○ Covalent bonding</li> <li>○ Writing word and symbol equation/balancing equations</li> <li>○ Knowledge of Periodic table</li> <li>○ Knowledge of bonding</li> <li>○ Basics of chemical reactions</li> <li>○ Properties of simple molecules</li> </ul>		
Literacy in Chemistry:	Reflection:	Numeracy Skills:
<p><b>Response to six markers (two-week cycle)</b></p> <ul style="list-style-type: none"> <li>○ Teacher provide detailed feedback to a six marker response with focus on; <b>content</b>, use of <b>key terms</b>, SPAG, <b>presentation</b>, <b>command words</b> and <b>coherence</b>, <b>logical reasoning</b></li> <li>○ Student respond and improve their work</li> </ul> <p><b>Frayers model</b></p> <ul style="list-style-type: none"> <li>○ Writing descriptions/observation during experiments</li> <li>○ Lesson <b>key terms</b> provided during lessons</li> <li>○ Claim –Evidence –Reasoning</li> <li>○ <b>Read</b> and <b>translate</b> information into other formats</li> </ul>	<p>Students are encouraged to reflect and to evaluate their own and others' which work fosters reflective learning and helps them understand how to improve. The following strategies are employed:</p> <ul style="list-style-type: none"> <li>○ Peer on peer/self-assessment during lesson</li> <li>○ Teacher feedback and student respond to improve</li> <li>○ End of unit/end of topic assessments are used to help student reflect and improve</li> </ul>	<p><b>Experimental skills:</b> Practical sessions are used to develop the following skills:</p> <ul style="list-style-type: none"> <li>○ Choosing appropriate graph, identifying variables and controls</li> <li>○ Collecting and Recording data, interpreting and describing trends and drawing conclusions</li> <li>○ Observing safety protocols and setting up apparatus safely</li> <li>○ Carrying out repeats, testing reliability of test data and identifying anomalous data</li> <li>○ Drawing conclusions</li> <li>○ Calculating averages/mean</li> </ul>

Week	Lesson Objectives	Activities	Assessment Opportunities (Afl)	Required practical and other practical	Skill development
Week 9 4.7.1.1  <b>11/11/24</b> <b>To</b> <b>17/11/24</b>	<b>Lesson 1: Alkanes and Hydrocarbons</b> -I can define the term hydrocarbon -I can describe the makeup of crude oil -I can give and use the general formula for alkanes -I can name and draw the first 4 alkanes	Introduction to crude oil. Description of the formation of crude oil and its composition.  Define a hydrocarbon. Alkanes and alkenes, molecular formulas, structural formulas. Activities: Drawing structural formulas for alkanes a Explain what is meant by the formula $C_n H_{(2n+2)}$	Assessment: Quiz on naming hydrocarbons and identifying their structures.		Pattern recognition and classification  Critical thinking and problem-solving
	<b>Lesson 2: Alkenes</b> I can recall and use the general formula for alkenes -I can describe alkenes as unsaturated -I can name and draw the first four alkenes -I can recall the equation for incomplete combustion -I can compare complete and incomplete combustions	<ul style="list-style-type: none"> <li>○ Student use the general formulae to generate the formulae of different alkene molecules</li> <li>○ Students draw the structural formulae for alkenes</li> <li>○ Student explain why alkenes are describing as unsaturated compounds</li> <li>○ <b>Teacher</b> models complete and incomplete combustion</li> <li>○ Students write and identify the products of complete and incomplete combustion</li> <li>○ <b>MA</b> – write balanced symbol equations</li> <li>○</li> </ul>			
Week 10 4.7.1.2 4.7.1.3  <b>18/11/24</b> <b>To</b> <b>24/11/24</b>	<b>Lesson 3: Fractional distillation</b> - I can recall why we need to distil oil into fractions -I can state some uses for the fractions of crude oil -I can describe the process of fractional distillation -I can recall how boiling point changes with chain length -I can recall how viscosity changes with chain length -I can recall how flammability changes with chain length -I can recall the equation for complete combustion	<ul style="list-style-type: none"> <li>○ Students take turns reading excerpts and teacher lead discussion around crude oil</li> <li>○ Student watch video on fractional distillation and label a fractionating column showing and explaining how fractions are separated.</li> <li>○ Given data on the physical properties such as Boiling points, solubility, viscosity, and flammability, students will describe and explain the pattern across hydrocarbons</li> </ul>			Interpretation and analysis if data  Linking property to separation techniques

<p>Week 11 4.7.1.4</p>	<p><b>Lesson 4: Alkenes and cracking</b></p> <p>-I can describe the reasons why we need to crack long hydrocarbon chains -I can describe the process of cracking by steam and via a catalyst -I can describe the results of testing for alkenes with bromine water</p>	<p>Given a chart(Pie/bar) on % composition of a typical crude oil, students explain the commercial importance of cracking.</p> <p>Student describe the process of cracking and the products of cracking</p> <p>Practical/Demo: students test for unsaturation using bromine water</p> <p>Student will use chemical equations to illustrate why bromine water changes colour</p>		<p>Demo or practical: crack paraffin over porous clay pot.</p>	<p>Research uses of common alkenes</p>
<p>Week 3 4.7.2.1 4.7.2.2  25/11/24 To 29/11/24</p>	<p><b>Lesson 5: Reactions of Alkenes</b></p> <p>-I can describe the reaction of alkenes with hydrogen -I can describe the reaction of alkenes with water -I can describe the reaction of alkenes with the halogens</p> <p>Know and draw the first four members of the homologous series of alkenes are ethene, propene, butene and pentene.</p>	<p>Teacher illustrate/model the reactions of alkenes with hydrogen, water and halogens.</p> <p>Explain what is meant by the formula <math>C_n H_{2n}</math></p> <p>Grade 9: draw the covalent bonding in:</p> <p>Students will be given a range of alkenes to their write chemical reactions with hydrogen, water, halogens and predict their respective products. AMA – will write balanced equations</p>		<p>Use bromine water to identify alkenes.</p> <p>Test for unsaturation in other compounds.</p>	
<p>4.7.2.3</p>	<p><b>Lesson 6: Alcohols</b></p> <p>I can recall the functional group for alcohols -I can name and draw the first four alcohols -I can recall the main uses for alcohols -I can describe what happens when alcohols react with <b>sodium</b> -I can describe what happens when alcohols react with <b>oxygen</b> -I can describe what happens when alcohols react with <b>water</b> -I can describe what happens when alcohols react with an <b>oxidising agent</b> -I can describe the conditions needed for fermentation</p>	<p>Students are shown a range of alcohols and asked to identify what they have in common.</p> <p>Students will define the term ‘homologous series’ Using the general formula, students will predict the formula of a range of alcohols.</p> <p>Teacher illustrate/model the reactions of alcohols with <b>sodium, oxygen, oxidising agents</b> and <b>water</b>.</p> <p>Students will be given a range of alcohols to their write chemical reactions with <b>sodium, water, oxidising</b> and predict their respective products.</p>			<p>Pattern recognition and classification</p>

		Know the <b>conditions</b> used for fermentation of sugar using yeast AMA – will write balanced equations			
Week 4 4.7.2.4  <i>02/12/24</i> <i>To</i> <i>08/12/24</i>	<b>Lesson 7: Carboxylic acids</b> -I can recall the functional group for carboxylic acids -I can name and draw the first four carboxylic acids -I can recall the main uses for carboxylic acids -I can describe what happens when carboxylic acids react with carbonates -I can describe what happens when carboxylic acids react with water I can describe what happens when carboxylic acids react with alcohols -I can name and draw ethyl ethanoate	Students describe what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols.  (HT only) Explain why carboxylic acids are weak acids in terms of ionisation and pH.  Student Recognise carboxylic acids from their names or from given formulae.  Know the names of the following individual carboxylic acids other than methanoic acid, ethanoic acid, propanoic acid and butanoic acid.			
4.7.3.1	<b>Lesson 8: Addition and Polymerisation</b> -I can define the terms monomer and polymer -I can explain the process of polymerisation -I can draw a polymer from a given monomer -I can draw the monomer from a given polymer	Define: <ul style="list-style-type: none"> <li>• monomer</li> <li>• polymer</li> <li>• polymerisation</li> <li>• repeating unit.</li> </ul> Describe the process of polymerisation. Model polymerisation using molecular model kits. Research uses of simple polymers. Visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects.			
Week 5 4.7.3.2 (HT only)  <i>09/12/24</i> <i>To</i> <i>15/12/24</i>	<b>Lesson 9: Condensation and Polymerisation</b> -I can recall that condensation polymerisation involved monomers with different functional groups -I can recall that condensation polymerisation involves the loss of a small molecules -I can explain the basic principles of condensation polymerisation -I can draw a polymer from a given monomer -I can draw the monomer from a given polymer	Students describe what takes place during condensation polymerisation. Identify monomers, polymers and repeating units.  Describe the polymerisation of ethane-1,2-diol and hexanedioic			

<p>4.7.3.3 4.7.3.4</p>	<p><b>Lesson 10: DNA and Amino acids</b> I can recall what DNA is -I can recall the structure of DNA -I can recall how DNA relates to amino acids -I can identify the two different functional groups in amino acid -I can describe how an amino acid polymerises -I can describe the process of amino acids joining together to form a polymer</p>	<p>Students describe the structure of DNA in terms of two polymer chains and nucleotides</p> <p>They research the history of the discovery of DNA as a polymer chain, including the contributions of Francis Crick, James Watson, Maurice Wilkins and Rosalind Franklyn.</p>			<p>Cross-disciplinary thinking</p>
<p>16/12/24 To 20/12/24</p>	<p><b>Lesson 11: Revision – Retrieval</b></p>				
	<p><b>Lesson 12 : End of Unit assessment</b> Identify areas of weakness and clarify misunderstandings. Review key points for improvement. Activities: Individual feedback sessions. Group revision activities based on common errors in the test.</p>				

## 4.8 Chemical analysis

Week	Lessons	Lesson objectives	Required practical and other practical
4.8.1.1 6/01/25 To 12/01/25	<b>Lesson 1:</b> Pure substances		
4.8.1.2	<b>Lesson 2:</b> Formulations		
4.8.1.3	<b>Lesson 3:</b> Chromatography		<b>Required practical 6:</b> investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R <sub>f</sub> values.
4.8.2.1 13/01/25 To 19/01/25	<b>Lesson 4:</b> Test for hydrogen		
4.8.2.2	<b>Lesson 5:</b> Test for oxygen		
4.8.2.3	<b>Lesson 6:</b> Test for carbon dioxide		
4.8.2.4	<b>Lesson 7:</b> Test for chlorine		
4.8.3.1	<b>Lesson 8:</b> Flame tests		
4.8.3.2 20/01/25 To 26/01/25	<b>Lesson 9:</b> Metal hydroxides		
4.8.3.3	<b>Lesson 10:</b> Carbonates		
4.8.3.4	<b>Lesson 11:</b> Halides		
4.8.3.5	Lesson 12: Sulphates		<b>Required practical 7:</b> use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections F

4.8.3.6	Lesson 13: Instrumental methods		
4.8.3.7	Flame emission spectroscopy		
End of unit test 27/01/25 To 31/01/25			

## 4.9 Chemistry of the atmosphere

Week	Lessons	Lesson objectives	Required practical and other practical
4.9.1.1 3/02/25 To 9/02/25	<b>Lesson 1:</b> The proportions of different gases in the atmosphere		
4.9.1.2	<b>Lesson 2:</b> The Earth's early atmosphere		
4.9.1.3	<b>Lesson 3:</b> How oxygen increased		
4.9.1.4	<b>Lesson 4:</b> How carbon dioxide decreased		
4.9.1.4	<b>Lesson 5:</b> Greenhouse gases		
4.9.1.2 10/02/25 To 16/02/25	<b>Lesson 6:</b> Human activities which contribute to an increase in greenhouse gases in the atmosphere		
4.9.2.3	<b>Lesson 7:</b> Global climate change		
4.9.2.4	<b>Lesson 8:</b> The carbon footprint and its reduction		
4.9.3.1	<b>Lesson 9:</b> Atmospheric pollutants from fuels		
4.9.3.2	<b>Lesson 10:</b> Properties and effects of atmospheric pollutants		
24/02/25 To 28/02/25	End of Unit test		

## 4. 10 Using resources

Week	Lessons	Required practical and other practical
4.10.1.1 3/03/25 To 9/03/25	<b>Lesson 1:</b> Using the Earth's resources and sustainable development	
4.10.1.2	<b>Lesson 2:</b> Potable water	<b>Required practical 8:</b> analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.
4.10.1.3	<b>Lesson 3:</b> Waste water treatment	
4.10.1.4	<b>Lesson 4:</b> Alternative methods of extracting metals (HT only)	
4.10.2.1 10/03/25 To 16/03/25	<b>Lesson 5:</b> Life cycle assessment	
4.10.2.2	<b>Lesson 6:</b> Ways of reducing the use of resources	
4.10.3.1	<b>Lesson 7:</b> Corrosion and its prevention	
4.10.3.2 17/03/25 To 23/03/25	<b>Lesson 8:</b> Alloys as useful materials	
4.10.3.3	<b>Lesson 9:</b> Ceramics, polymers and composites	
4.10.4.1 24/03/25 To 30/03/25	<b>Lesson 10:</b> The Haber process	

4.10.4.2	Production and uses of NPK fertilisers	
31/03/25 To 4/04/25	End of unit assessments	