


<p><b>Year 10: Combined Chemistry</b></p>	<p>- <b>Curriculum Intent:</b> Year 10 Chemistry tackles more complex ideas and concepts in the subject. It builds on the key knowledge from years 7,8 and 9 to link together all the areas of the subject. The key areas of particles, reactions, monitoring reactions and earth and environmental science are developed through more challenging topics such as structure and bonding, advanced chromatographic methods, mole calculations, electrolysis and trends in the periodic table. Knowledge of key industrial chemical processes is also developed. Procedural knowledge and practical skills are developed further, building on experience with making salts, neutralisation, redox and displacement reaction. The curriculum in year 10 aims to bring everything together so that students have a complete understanding of the Chemistry aspect of the Combined Science course.</p>						
	<p><b>Autumn 1</b></p>	<p><b>Autumn 2</b></p>	<p><b>Spring 1</b></p>	<p><b>Spring 2</b></p>	<p><b>Summer 1</b></p>	<p><b>Summer 2</b></p>	
<p><b>Key ideas and sequence of learning</b></p>	<p><b>Module C3 - Chemical reactions</b></p> <ul style="list-style-type: none"> <li>• revision/retrieval</li> <li>• Formulae of compounds</li> <li>• Formulae of ionic compounds</li> <li>• Conservation of mass</li> <li>• Balancing equations</li> <li>• Half equations and ionic equations (H)</li> <li>• Detecting gases</li> <li>• Moles</li> <li>• Concentration and moles</li> </ul>	<p><b>Module 3 - Chemical reactions</b></p> <ul style="list-style-type: none"> <li>• Endothermic and exothermic reactions</li> <li>• Reaction profiles</li> <li>• Bond energies (H)</li> <li>• Acid and alkali reactions</li> <li>• pH and neutralisation</li> <li>• reactions of acids</li> <li>• REDOX</li> <li>• Electrolysis reactions</li> </ul>	<p><b>Module 5: Monitoring and controlling chemical reactions.</b></p> <ul style="list-style-type: none"> <li>• Rates of reactions</li> <li>• Calculating the rate of reactions from graphs and data</li> <li>• Calculating average rate</li> <li>• Calculating instantaneous rate</li> <li>• reversible reactions</li> <li>• equilibrium</li> <li>• choosing reaction conditions</li> </ul>	<p><b>Module 6: Global challenges</b></p> <ul style="list-style-type: none"> <li>• Extracting metals</li> <li>• Extracting iron</li> <li>• Extracting aluminium</li> <li>• Phytoextraction</li> <li>• Bioleaching</li> <li>• Choosing and recycling materials</li> <li>• Alkanes and fractional distillation of crude oil</li> <li>• Cracking</li> <li>• Formation of atmosphere</li> <li>• Pollution and atmosphere</li> <li>• Climate change</li> </ul>	<p>Students sit their EoY exams</p> <p>Students will complete practical investigations.</p> <p>Students will review their PPE exam papers.</p>	<p><b><u>Separate Science Students</u></b></p> <p><b>Module 6: Global challenges</b></p> <ul style="list-style-type: none"> <li>• Water for drinking</li> <li>• Alkanes</li> <li>• Alkenes</li> <li>• Alcohols</li> <li>• Carboxylic acids</li> <li>• Condensation polymers</li> <li>• Instrumental analysis</li> </ul> <p><b><u>Combined Science Students</u></b></p> <p>Recap and reteach C1 (particles) and C2.1 (elements, compounds and mixtures)</p>	

## Key Questions

1. How do you write the formulae of ionics given its ions?
2. How do you balance a chemical equation?
3. What are the 4 state symbols?
4. What is a mole?
5. How do you calculate moles?
6. How do you use mole ratios to find reacting masses?

1. When does hydrogen and oxygen form during electrolysis?
2. Can you write half equations to describe electrolysis?
3. Can you define reduction and oxidation in terms of electrons?
4. Can you write ionic and half equations to describe redox reactions?
5. Can you use bond energies to calculate if a reaction is endothermic or exothermic?
6. What is a neutralisation reaction?
7. What is the difference between dilute and concentrated acids?
8. What is the difference between strong and weak acids?
9. How does the pH relate to the  $H^+$  concentration?

1. Can you write and balance reactions with group 1?
2. Can you calculate the average rate of reaction from data or a graph?
3. Can you calculate the instantaneous rate of reaction from a graph?
4. What is equilibrium?
5. How does temperature affect equilibrium position?
6. How does pressure affect equilibrium position?

1. How are metals extracted from ore using carbon?
2. How does electrolysis extract aluminium and what are its advantages and disadvantages?
3. What are the advantages and disadvantages of extracting metals with biological methods?
4. How are materials recycled?
5. Choosing materials by analysing the properties
6. How is crude oil extracted using fractional distillation?
7. Why is cracking carried out?
8. How was our atmosphere formed and how has it evolved?
9. Cause, effect and controlling pollutants
10. Impact of carbon emission on climate change

## Separate Chemistry:

1. Explain the importance of carrying out physical, chemical and biological purification to make potable water.
2. What are some of the chemical and physical properties of hydrocarbons and alcohols?
3. Can you draw structures and write equations for the formation of polyester and polyamides?
4. can you name and identify structures of monomers for a given polymer?
5. explain the importance of instrumental methods
6. can you analyse information from infra red, mass spec and gas chromatography data to identify the molecules?

<p style="text-align: center;"><b>Vocabulary</b></p>	<ul style="list-style-type: none"> <li>• Hydrogen</li> <li>• Carbon dioxide</li> <li>• Oxygen</li> <li>• Chlorine</li> <li>• Moles</li> </ul>	<ul style="list-style-type: none"> <li>• Endothermic</li> <li>• Exothermic</li> <li>• Cation &amp; anion</li> <li>• Anode &amp; cathode</li> <li>• Electrolysis</li> <li>• Reduction</li> <li>• Oxidation</li> <li>• Panic</li> <li>• Half equation</li> <li>• Ionic equation</li> <li>• Neutralisation</li> <li>• Dilute</li> <li>• Concentrated</li> <li>• Strong acid</li> <li>• Weak acid</li> <li>• Dissociation</li> <li>• Hydrogen ion</li> <li>• pH</li> </ul>	<ul style="list-style-type: none"> <li>• Equilibrium</li> <li>• Forward reaction</li> <li>• Reverse reaction</li> <li>• Average rate</li> <li>• Instantaneous rate</li> <li>• Tangent</li> <li>• Gradient</li> <li>• Reactant</li> <li>• Product</li> </ul>	<ul style="list-style-type: none"> <li>• Extraction</li> <li>• Blast furnace</li> <li>• Electrolysis</li> <li>• Ore</li> <li>• Cryolite</li> <li>• Bauxite</li> <li>• Phytoextraction</li> <li>• Bioleaching</li> <li>• Low grade ore</li> <li>• Alkanes</li> <li>• Saturated hydrocarbon</li> <li>• Unsaturated hydrocarbons</li> <li>• Cracking</li> </ul>		<p>(see Year 9 Schemes Of Learning's for combined vocabulary)</p> <ul style="list-style-type: none"> <li>• Potable water</li> <li>• Combustion</li> <li>• Homologous series</li> <li>• Saturated hydrocarbons</li> <li>• Unsaturated hydrocarbons</li> <li>• Oxidation</li> <li>• Effervescence</li> <li>• Polymerization</li> <li>• Condensation reaction</li> </ul>
<p style="text-align: center;"><b>Practical Skills</b></p>	<ul style="list-style-type: none"> <li>• Conservation of mass – making magnesium oxide and calcium carbonate with acid</li> <li>• Detecting gases – hydrogen, oxygen, chlorine and carbon dioxide.</li> </ul>	<ul style="list-style-type: none"> <li>• Electrolysis of copper chloride solution</li> <li>• pH of acids</li> <li>• making salts such as copper sulfate and sodium chloride</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring rates of reaction to investigate the effect to temperature, catalyst, concentration and surface area on the rate of reaction</li> </ul>	<ul style="list-style-type: none"> <li>• Extracting copper from copper carbonate</li> </ul>	<ul style="list-style-type: none"> <li>• Rates of reaction</li> <li>• Separating and purifying mixtures</li> </ul>	<ul style="list-style-type: none"> <li>• Use bromine water test to distinguish between alkanes and alkenes</li> <li>• Make observations when oxidation of alcohols is carried out and when they react with sodium</li> <li>• Make nylon using condensation reactions</li> <li>• Reactions of carboxylic acids with metal, metal carbonate and alkali</li> </ul>