

## Year 12 - OCR A-level (H432) Chemistry

| Timing           | Unit Title   | Key Question   | Knowledge  | Assessing understanding  |
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| Autumn<br>Term 1 | <b>Module 2</b><br><b>Chapter 2</b><br><b>Chapter 5</b><br><b>Chapter 7</b><br><br><b>Structure of atoms</b><br><br><b>Bonding</b> | <b>What are the nuclear and electronic structure of atoms?</b><br><br><b>How do atoms bond together?</b> | <ul style="list-style-type: none"> <li>Atoms and isotopes</li> <li>RAM and using a mass spectrometer</li> <li>Arrangement of electrons in atoms</li> <li>Ionisation energy</li> <li>Electronic configuration and s,p,d, f orbitals</li> <li>Theories of ionic, covalent and metallic bonding</li> <li>Periodicity</li> </ul> | <p><b>How understanding is assessed</b><br/>Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>Recall the knowledge covered</li> <li>Explain the chemical phenomena</li> <li>Interpret graphical and experimental data</li> <li>Make connections between different areas of understanding.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Description</li> <li>Explanation</li> <li>Evaluation</li> <li>Comparison</li> <li>Planning and carrying out investigations</li> <li>Chemical calculations</li> </ul> <p><b>Assessment point information</b></p> <p>Based on two written tests on:</p> <ul style="list-style-type: none"> <li>Atomic Structure and Calculations</li> <li>Structure and Bonding</li> </ul> <p><b>Practical endorsement</b></p> <ul style="list-style-type: none"> <li>1.2 <u>Determination of the relative atomic mass of magnesium</u></li> <li>2.1 <u>Determination of concentration of hydrochloric acid</u></li> <li>2.2 <u>Determination of the molar mass of an acid</u></li> </ul> |
|                  | <b>Module 2</b><br><b>Chapter 3</b><br><br><b>Amounts of substance</b>   | <b>How do we calculate amounts of substance in chemistry?</b>  | <ul style="list-style-type: none"> <li>Formulae and equations,</li> <li>Using moles</li> <li>Measuring concentration</li> <li>Reacting masses</li> <li>% yield and atom economy.</li> <li>Gas calculations and Ideal Gas Equation</li> <li>Titration and titration calculations</li> </ul>                                   |  |
|                  | <b>Module 2</b><br><b>Chapter 4</b><br><br><b>Acids and Redox</b>  | <b>How can we make and purify salts?</b>   | <ul style="list-style-type: none"> <li>Acid-base reactions and salt production</li> <li>Anhydrous and hydrated salts</li> </ul>  |  |

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| Autumn<br>Term 2 | <b>Module 2<br/>Chapter 6</b><br><br><b>Shapes of<br/>molecules</b> | <b>How can we<br/>predict the<br/>shapes of<br/>molecules?</b>  | <ul style="list-style-type: none"><li>• VSEPR theory and shapes of molecules.</li><li>• Types of intermolecular forces</li></ul>  |  |
|                  | <b>Module 2<br/>Chapter 4</b><br><br><b>Redox</b>                   | <b>How is the<br/>concept of<br/>oxidation number<br/>useful in<br/>explaining redox<br/>reactions?</b> | <ul style="list-style-type: none"><li>• Oxidation number</li><li>• Balancing redox equations</li></ul>  |  |
|                  | <b>Module 3<br/>Chapter 8</b><br><br><b>Reactivity<br/>Trends</b>   | <b>How are<br/>reactions related<br/>to position of an<br/>element in the<br/>periodic table?</b>       | <ul style="list-style-type: none"><li>• Reactions of Group 2 metals and compounds.</li><li>• Reactions of Group 7 – the halogens and their compounds</li><li>• Qualitative analysis</li></ul> |  |

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|               | Module 4<br>Chapter 11<br>Chapter 12            | What are the structures and properties of hydro-carbons?      | <ul style="list-style-type: none"> <li>• Origin of hydrocarbons and nomenclature</li> <li>• Reactions of alkanes</li> <li>• Types of bond breaking</li> <li>• Free radical substitution</li> </ul>  |  |
| Spring Term 1 | Module 3<br>Chapter 9<br><br>Energy             | How much energy change is associated with chemical reactions? | <ul style="list-style-type: none"> <li>• Measuring energy changes</li> <li>• Defining important enthalpy changes</li> <li>• Using Hess's Law</li> <li>• Using bond enthalpies</li> </ul>  | <p><b>How understanding is assessed</b><br/>Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>• Recall the knowledge covered</li> <li>• Explain the chemical phenomena</li> <li>• Interpret graphical and experimental data</li> <li>• Make connections between different areas of understanding.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Description</li> <li>• Explanation</li> <li>• Evaluation</li> <li>• Comparison</li> <li>• Planning and carrying out investigations</li> <li>• Chemical calculations</li> </ul> <p><b>Assessment point information</b></p> <p>Based on:</p> <ul style="list-style-type: none"> <li>• Two written tests on               <ul style="list-style-type: none"> <li>○ Periodic Table and Energy</li> <li>○ Organic Chemistry</li> </ul> </li> </ul> <p><b>Practical endorsement</b></p> <ul style="list-style-type: none"> <li>• 4.2 <u>Identifying unknowns</u></li> </ul> |
|               | Module 4<br>Chapter 13<br><br>Organic Chemistry | What are the structures and properties of hydro-carbons?      | <ul style="list-style-type: none"> <li>• Reactions of alkenes</li> <li>• The carbon-carbon double bond and delocalisation</li> <li>• Cis-trans/E-Z isomerism</li> <li>• Electrophilic addition and Markovnikov's rule</li> <li>• Describing mechanisms using curly arrow notation</li> <li>• Polymerisation and issues surrounding use, recycling and disposal of plastics</li> </ul> |  |
|               | Module 3<br>Chapter 10<br><br>Rate              | What influences the rate of a chemical reaction?              | <ul style="list-style-type: none"> <li>• Qualitative ideas about factors that affect chemical reactions</li> <li>• Methods for measuring rates of reaction</li> <li>• Activation energy</li> </ul>  |  |

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|               | Equilibrium  | How far do reactions go?  | <ul style="list-style-type: none"> <li>Catalysis</li> <li>Qualitative ideas about dynamic equilibrium</li> <li>Changing the position of equilibrium</li> </ul>   | <ul style="list-style-type: none"> <li>3.1 <u>Determination of the enthalpy change of neutralisation</u></li> <li>3.2 <u>Determination of a enthalpy change of reaction by Hess' Law</u></li> <li>3.3 <u>Determination of enthalpy changes of combustion</u></li> <li>5.2 <u>Preparation of cyclohexene</u></li> </ul>   |
| Spring Term 2 | <b>Module 4</b><br><b>Chapter 14</b><br><b>Chapter 15</b><br><b>Chapter 16</b><br><br>Alcohols and halogenoalkanes | What are the structures and properties of alcohols and halogenoalkanes? | <ul style="list-style-type: none"> <li>Properties and reactions of alcohols</li> <li>Reactions of halogenoalkanes</li> <li>Uses of halogenoalkanes and associated issues</li> <li>Identifying halogenoalkanes</li> <li>Preparing halogenoalkanes from alcohols and vice versa</li> <li>Organic synthetic techniques</li> </ul> | <b>How understanding is assessed</b><br><br>Students will be assessed on their ability to: <ul style="list-style-type: none"> <li>Recall the knowledge covered</li> <li>Explain the chemical phenomena</li> <li>Interpret graphical and experimental data</li> <li>Make connections between different areas of understanding.</li> </ul> <b>Skills</b> <ul style="list-style-type: none"> <li>Description</li> <li>Explanation</li> <li>Evaluation</li> <li>Comparison</li> <li>Planning and carrying out investigations</li> <li>Chemical calculations</li> </ul> |
|               | <b>Module 4</b><br><b>Chapter 17</b><br><br>Analytical techniques  | What information can we obtain from analysis of chemical compounds?     | <ul style="list-style-type: none"> <li>Mass spectrometry</li> <li>Infra-red spectroscopy</li> </ul>  |  |
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| Summer Term 1 | Study leave and exams  | What is the best preparation for your AS/Internal Chemistry exams?      | <ul style="list-style-type: none"> <li>Revision and past paper practise</li> </ul>   | <b>How understanding is assessed</b><br>Students will be assessed on their ability to: <ul style="list-style-type: none"> <li>Recall the knowledge covered</li> <li>Explain the chemical phenomena</li> <li>Interpret graphical and experimental data</li> </ul>   |

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|               |  |   |   | <ul style="list-style-type: none"> <li>• Make connections between different areas of understanding.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Description</li> <li>• Explanation</li> <li>• Evaluation</li> <li>• Comparison</li> <li>• Planning and carrying out investigations</li> <li>• Chemical calculations</li> </ul> <p><b>Assessment point information</b></p> <p>Based on:</p> <ul style="list-style-type: none"> <li>• Internal AS level examinations</li> </ul> |
| Summer Term 2 | <b>Module 5</b><br><b>Chapter 19</b><br><br><b>Equilibria</b>      | <b>What happens when reactions do not go to completion?</b> | <ul style="list-style-type: none"> <li>• Equilibrium constants</li> <li>• Calculating <math>K_c</math> and <math>K_p</math></li> <li>• Determination of <math>K_c</math></li> <li>• Effect of concentration, temperature, pressure and catalysts on equilibrium position</li> </ul> | <p><b>Practical endorsement</b></p> <ul style="list-style-type: none"> <li>• 6 <u>Preparation of aspirin</u></li> </ul>  |
|               | <b>Module 6</b><br><b>Chapter 25</b><br><br><b>Arene chemistry</b> | <b>What is so special about <math>C_6H_6</math>?</b>        | <ul style="list-style-type: none"> <li>• Structure and bonding in benzene</li> <li>• Electrophilic substitution mechanism</li> <li>• Reactions of benzene</li> <li>• Reactions of phenol</li> <li>• Directing groups</li> </ul>   |  |
|               | <b>Practical skills</b><br><b>Making aspirin</b>                   |   | <ul style="list-style-type: none"> <li>• Making aspirin</li> </ul>  |  |