

**Scheme of Work 2020 – 2021 (HT5)**  
**Subject: AS Chemistry**

**Year Group: 12**  
**Specification: AQA 7404**

| Lesson No                        | Topic & Objectives                                                                                                           | Big Question – What will students learn?                                                                                                                                                                                                                                                               | Key Activities & Specialist Terminology (Do Now Task / Starter/Tasks/Plenary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Planned Assessment                                                                                                                                                                                                                                                     | Homework or flipped learning resources<br><br>DODDLE resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Lit Num SMSC Codes                      |
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| 3.3.5.2<br>Oxidation of alcohols | <p>Oxidation reactions of primary, secondary and tertiary alcohols.</p> <p>Testing to distinguish aldehydes and ketones.</p> | <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>Classify alcohols as primary, secondary or tertiary.</li> <li>Identify products and write equations for oxidation reactions of alcohols.</li> <li>Use chemical tests to distinguish aldehydes and ketones.</li> </ul> | <ul style="list-style-type: none"> <li>Draw and name alcohols and classify them as primary, secondary or tertiary (AO2 - Apply knowledge and understanding of scientific ideas).</li> <li>Write equations to show oxidation reactions of alcohols (AO2 - Apply knowledge and understanding of scientific ideas).</li> <li>Practical opportunity: Carry out test-tube reactions to distinguish tertiary alcohols from primary and secondary by reaction with acidified potassium dichromate(VI) (AO2 - Apply knowledge and understanding of scientific ideas; AT b - Use water bath or electric heater or sand bath for heating; AT d - Use laboratory apparatus for qualitative tests for organic functional groups; AT k - Safely and carefully handle solids and liquids, including corrosive, irritant, flammable and toxic substances).</li> <li>Practical opportunity: Carry out test-tube reactions to distinguish aldehydes from ketones by reaction with Tollens' reagent and Fehling's solution (AO2 - Apply knowledge and understanding of scientific ideas; AT b - Use water bath or electric heater or sand bath for heating; AT d -</li> </ul> | <ul style="list-style-type: none"> <li>January 2013 Unit 2 Question 5 (QW13.02.05)</li> <li>June 2006 Unit 3 Question 5 (QS06.3.05)</li> <li>January 2005 Unit 3 Question 3 (QW05.3.03)</li> <li>June 2004 Unit 3 Question 3 (not part (a)(ii)) (QS04.3.03)</li> </ul> | <p>Test-tube oxidation reactions of alcohols:<br/><a href="http://www.nuffieldfoundation.org/practical-chemistry/oxidation-alcohols">http://www.nuffieldfoundation.org/practical-chemistry/oxidation-alcohols</a></p> <p>Disposal breathalysers are available (legal requirement for driving in France)</p> <p>The breathalyser reaction<br/><a href="http://www.nuffieldfoundation.org/practical-chemistry/%E2%80%98breathalyser%E2%80%99-reaction">http://www.nuffieldfoundation.org/practical-chemistry/%E2%80%98breathalyser%E2%80%99-reaction</a></p> <p>Giant silver mirror<br/><a href="http://www.nuffieldfoundation.org/practical-chemistry/giant-silver-mirror">http://www.nuffieldfoundation.org/practical-chemistry/giant-silver-mirror</a></p> | <p>C3</p> <p>C3</p> <p>C3</p> <p>C3</p> |

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|                        |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                               | <p>Use laboratory apparatus for qualitative tests for organic functional groups; AT k - Safely and carefully handle solids and liquids, including corrosive, irritant, flammable and toxic substances).</p> <ul style="list-style-type: none"> <li>• Practical opportunity: The preparation of ethanal (AO2 - Apply knowledge and understanding of scientific ideas; AT b - Use water bath or electric heater or sand bath for heating; AT d - Use laboratory apparatus for a variety of experimental techniques including distillation and heating under reflux, including setting up glassware using retort stand and clamps; AT k - Safely and carefully handle solids and liquids, including corrosive, irritant, flammable and toxic substances).</li> <li>• Giant silver mirror demonstration. (AO2 - Apply knowledge and understanding of scientific ideas).</li> </ul>       |                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                       |                               |
| 3.3.5.3<br>Elimination | <p>Formation of alkenes by elimination reactions of alcohols (mechanism required).</p> <p>Making addition polymers from alkenes made from alcohols.</p> <p><b>Required practical 5</b><br/>Distillation of a product</p> | <p><b>Students should be able to:</b></p> <ul style="list-style-type: none"> <li>• identify products of alcohol elimination reactions</li> <li>• write equations and mechanism for alcohol elimination reactions</li> <li>• understand how addition polymers can be made from alkenes made this way without using monomers derived from crude oil.</li> </ul> | <ul style="list-style-type: none"> <li>• Students should identify alkenes formed from elimination of alcohols and write equations and mechanism for their production (AO2 - Apply knowledge and understanding of scientific ideas).</li> <li>• Practical opportunity: Students could carry out the preparation of cyclohexene from cyclohexanol, including purification using a separating funnel and by distillation (AO2 - Apply knowledge and understanding of scientific ideas; AT b - Use water bath or electric heater or sand bath for heating; AT d - Use laboratory apparatus for a variety of experimental techniques including distillation and heating under reflux, including setting up glassware using retort stand and clamps; AT g - Purify a liquid product, including use of separating funnel; AT k - Safely and carefully handle solids and liquids,</li> </ul> | <ul style="list-style-type: none"> <li>• June 2003 Unit 3 Question 4b (QS03.3.4B)</li> <li>• SAMs AS Paper 2 (set 1) Question 1</li> </ul> | <p>Preparation of cyclohexene<br/><a href="http://www.chemsheets.co.uk/Chemsheets%20AS%20079%20(Preparation%20of%20cyclohexene).pdf">http://www.chemsheets.co.uk/Chemsheets%20AS%20079%20(Preparation%20of%20cyclohexene).pdf</a></p> <p><i>Chemistry Review</i> article: Heating under reflux (Volume 20, edition 2)</p> <p><i>Chemistry Review</i> article: Distillation (Volume 14, edition 3)</p> | <p>C3</p> <p>C3</p> <p>C3</p> |

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|                                      | from a reaction.                                                                                                                                    |                                                                                                                                                                                                                                                                   | including corrosive, irritant, flammable and toxic substances.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                       |              |
| <b>3.3.6 Organic analysis</b>        | Use chemical tests to distinguish functional groups.<br><br><b>Required practical 6</b><br>Tests for alcohol, aldehyde, alkene and carboxylic acid. | <b>Students should be able to:</b><br><ul style="list-style-type: none"> <li>carry out test-tube reactions in the specification to distinguish alcohols, aldehydes, alkenes and carboxylic acids, and interpret the observations from these reactions.</li> </ul> | <ul style="list-style-type: none"> <li>Practical opportunity: Students carry out test-tube reactions in the specification to distinguish alcohols, aldehydes, alkenes and carboxylic acids (AO2 - Apply knowledge and understanding of scientific ideas; AT b - Use water bath or electric heater or sand bath for heating; AT d - Use laboratory apparatus for qualitative tests for organic functional groups; AT k - Safely and carefully handle solids and liquids, including corrosive, irritant, flammable and toxic substances; PS 2.2 - Present results of reactions in appropriate ways; PS 2.3 - Evaluate results and draw conclusions).</li> </ul> <p>Write equations for the reactions occurring. (AO2 - Apply knowledge and understanding of scientific ideas).</p> | <ul style="list-style-type: none"> <li>June 2012 Unit 4 Question 7 (QS12.4.07)</li> <li>January 2013 Unit 4 Question 6a (QW13.4.06)</li> </ul>  | <p>Test-tube oxidation reactions of alcohols:<br/> <a href="http://www.nuffieldfoundation.org/practical-chemistry/oxidation-alcohols">http://www.nuffieldfoundation.org/practical-chemistry/oxidation-alcohols</a></p> <p><i>Chemistry Review</i> article: Identifying an unknown compound (Volume 17, edition 3)</p> | C3<br><br>C3 |
| <b>3.3.6.2 Mass spectrometry</b>     | Use high resolution mass spectrometry to find molecular formulae.                                                                                   | <b>Students should be able to:</b><br><ul style="list-style-type: none"> <li>use precise atomic masses and the precise molecular mass to determine the molecular formula of a compound.</li> </ul>                                                                | Students use precise atomic masses to calculate the precise molecular mass of a compound in order to determine the molecular formula (AO2 - Apply knowledge and understanding of scientific ideas; MS1.1 - Use an appropriate number of significant figures).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>June 2012 Unit 2 Question 3c (QS12.2.03)</li> <li>January 2010 Unit 2 Question 6e (QW10.2.06)</li> </ul> | Mass spectrometry calculator:<br><a href="http://www.sisweb.com/mstools/isotope.htm">http://www.sisweb.com/mstools/isotope.htm</a>                                                                                                                                                                                    | C3           |
| <b>3.3.6.4 Infrared spectroscopy</b> | Use infrared absorptions to identify functional groups.                                                                                             | <b>Students should be able to:</b><br><ul style="list-style-type: none"> <li>identify functional groups from infra-red spectra</li> <li>understand how the "fingerprint" region of a spectrum can be used</li> </ul>                                              | <ul style="list-style-type: none"> <li>Students identify functional groups from infra-red spectra (AO2 - Apply knowledge and understanding of scientific ideas).</li> <li>Students research the relative effect of different gases on global warming (AO3 - Analyse, interpret and evaluate scientific information).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>June 2012 Unit 2 Question 8bii (QS12.2.08)</li> <li>June 2011 Unit 2 Question 6e (QS11.1.06)</li> </ul>  | Spectroscopy in a suitcase from RSC (including potential visit to your school/college by a university team with IR spectrometer):                                                                                                                                                                                     | C3           |

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|  | <p>Know how the "fingerprint" region can be used.</p> <p>The role of infrared absorption by molecule in global warming.</p> | <p>understand the link between absorption of infrared radiation by bonds in CO<sub>2</sub>, methane and water vapour and global warming.</p> |  | <ul style="list-style-type: none"> <li>• January 2012 Unit 2 Question 10 (QS12.2.10)</li> <li>• June 2009 Unit 2 Question 9 (QS09.2.09)</li> </ul> | <p><a href="http://www.rsc.org/learn-chemistry/resource/res0000283/spectroscopy-in-a-suitcase-ir-student-resources">http://www.rsc.org/learn-chemistry/resource/res0000283/spectroscopy-in-a-suitcase-ir-student-resources</a></p> <p>IR spectroscopy resources:<br/><a href="http://www.chemsheets.co.uk/page3.html">http://www.chemsheets.co.uk/page3.html</a></p> <p>Greenhouse gas IR spectra:<br/><a href="http://www.chem.wisc.edu/middlecamp/108-Fall08/work/IR_spec5.swf">http://www.chem.wisc.edu/middlecamp/108-Fall08/work/IR_spec5.swf</a></p> <p><i>Chemistry Review</i> article: Infrared spectrometers (Volume 21, edition 2)</p> | <p>C3</p> <p>C3</p> <p>C3</p> |
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