

Sample Teaching Plan
Unit G624: Chemicals for a Purpose

Suggested teaching time

Plan is based on 12 weeks at 5 hours per week (4 hours contact time + 1 hour directed study)

The learning activities are suggestions only. Teachers may wish to develop alternative strategies. The plan should be read alongside the G624 Specification and, in particular, the Assessment Evidence Grid (attached for your reference).

Week number	Specification Unit Reference and Assessment Objectives	Suggested Learning Activities	Resources
1 – 2	<p>3.5.1: Organic and Inorganic Compounds</p> <p>- focus on inorganic compounds</p>	<p>Types of Bonding</p> <p>Teacher and candidate revision of difference between organic and inorganic compounds, ionic and covalent bonding and the physical properties (solubility, melting points and boiling points) resulting from the forces between atoms, ions and molecules in these compounds.</p> <p>Discuss the difference in properties between ionic and covalent compounds:</p> <ul style="list-style-type: none"> • find and use data about properties in order to classify compounds as ionic or covalent. <p>Focus on inorganic compounds:</p> <ul style="list-style-type: none"> • write formulae for listed inorganic compounds used and made in industry. • use the physical properties of given compounds to explain their uses. • evaluate the use of a compound in terms of its properties. <p>Suggest/introduce basic practical work on inorganic preparations and ionic properties.</p>	<p>A Level Chemistry textbooks .</p> <p>OCR A Level Applied Science Heinemann 978 0435692 12 4.</p> <p>Teacher handout notes and/or resource-based introduction notes.</p> <p>Suitable GCSE/AS textbooks.</p> <p>Basic practical activities on properties of ionic and covalent compounds.</p> <p>www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1202115622321</p> <p>www.rsc.org/education/teachers/learnnet/classic_exp.htm</p> <p>www.rsc.org/education/teachers/learnnet/inspirational/index.htm</p>

Week number	Specification Unit Reference and Assessment Objectives	Suggested Learning Activities	Resources
3	<p>3.5.1: Organic and Inorganic Compounds</p> <p>- focus on inorganic compounds</p>	<p>Examples made on a large scale.</p> <p>Research and write detailed account of two inorganic compounds following criteria for AO1.</p> <p>Student centred research with a focus to completing <i>Sample Assignment A</i>.</p>	<p>Essential Chemical Industry Chemical Industry Education Centre (C.I.E.C.) 185 342 577 X.</p> <p><i>Sample Assignment A:</i> Useful Inorganic Chemical Compounds - candidates could chose to do Task 2 on two inorganic compounds.</p>
4 – 5	<p>3.5.1: Organic and Inorganic Compounds</p> <p>- focus on organic compounds</p>	<p>Teacher introduction to homologous series and the deduction of the structural formulae of the listed organic compounds.</p> <p>Research common uses for the listed organic compounds.</p> <p>Draw and recognise the structural formulae of simple alkanes and alkenes, benzene, alcohols and esters.</p> <p>Know the range of uses of the typical organic compounds listed.</p> <p>Introduce some basic organic practical work to prepare organic compounds.</p>	<p>Teacher handout notes.</p> <p>Suitable textbooks at Level 3.</p> <p>Molecular models.</p> <p>Research work can be organic practical.</p> <p>Ideas from: www.practicalchemistry.org/</p>
6	<p>3.5.1: Organic and Inorganic Compounds</p> <p>- focus on organic compounds</p>	<p>Examples made on a large scale.</p> <p>Research and write detailed account of two organic compounds following criteria AO1.</p> <p>Student centred research with a focus to completing <i>Sample Assignment B</i>.</p>	<p>Essential Chemical Industry .</p> <p>Chemical Industry Education Centre (C.I.E.C.) 185 342 577 X.</p> <p><i>Sample Assignment B:</i> Useful Organic Chemical Compounds.</p> <p>www.practicalchemistry.org/</p>

Week number	Specification Unit Reference and Assessment Objectives	Suggested Learning Activities	Resources
7 – 8	<p>3.5.2: The Chemistry of Oil Products</p> <p>3.5.4: Preparation and analysis of chemical products</p>	<p>Research into petroleum chemistry to find examples and uses of the compounds listed.</p> <ul style="list-style-type: none"> • give examples and uses of some chemical products from petrochemicals, e.g. esters, polyesters, addition polymers. • introduce more advance organic techniques and terms. • this can be linked with practical work. <p>Could prepare a polymer (RSC).</p> <ul style="list-style-type: none"> • calculation of % yield. <p>Introduce work required for main preparation.</p> <p>Student work – <i>Sample assignment D</i></p> <p>Suggestion: Aspirin.</p> <ul style="list-style-type: none"> • research an appropriate method to prepare a small sample of a chemical for research and testing. • carry out a full risk assessment. • use ratio, proportion and percentages to work out amounts of substances. • use the chemical equation to work out the theoretical yield. • adapt the method to maximise the yield. • purify the product by recrystallisation or distillation. • calculate the % yield and evaluate the method used. • research and use appropriate techniques to purify and check the purity of the product. 	<p>Candidate based research using book and electronic resources.</p> <p>Use of video, DVD and other commercially produced audiovisual resources.</p> <p>Preparation of aspirin can be completed here (practical instructions in teacher's guide).</p> <p>RSC – good source of practical activities.</p> <p>Good sources of organic preparations – Chemistry in Context, Hill & Holman.</p> <p>www.rod.beavon.clara.net/chemistry/contents.htm</p> <p><i>Sample Assignment D:</i> Preparation of chosen product.</p> <p>Paper and electronic resources detailing the compound to be made.</p> <p>These should include the details necessary to carry out this assignment.</p> <p>Use of classwork notes for similar preparations.</p> <p>Chemical catalogues or Health and Safety handbooks that list the hazards of the materials used and prepared in this assignment.</p> <p>Link with Unit G620 (aspirin) preparation could be also used here.</p>

Week number	Specification Unit Reference and Assessment Objectives	Suggested Learning Activities	Resources
9 – 10	3.5.4: Preparation and analysis of chemical products	<p>Revisit inorganic chemistry and discuss suitable product to prepare.</p> <p>Research and look at general use e.g. copper sulphate and sodium thiosulfate.</p> <p>Revisit % yield work.</p> <p>Purification techniques.</p> <p>Student work – <i>Sample assignment D</i></p> <ul style="list-style-type: none"> • research an appropriate method to prepare a small sample of a chemical for research and testing. • carry out a full risk assessment. • use ratio, proportion and percentages to work out amounts of substances. • use the chemical equation to work out the theoretical yield. • adapt the method to maximise the yield. • purify the product by recrystallisation or distillation. • calculate the % yield and evaluate the method used. • research and use appropriate techniques to purify and check the purity of the product. 	<p>RSC – good source of practical activities.</p> <p>Good sources of organic preparations – Chemistry in Context, Hill & Holman.</p> <p><i>Sample Assignment D:</i> Preparation of chosen product.</p>

Week number	Specification Unit Reference and Assessment Objectives	Suggested Learning Activities	Resources
11 – 12	3.5.3: Manufacturing Processes - AO2	<p>Theory and research into the various catalysts:</p> <ul style="list-style-type: none"> • explain how catalysts work. • practical work to illustrate different catalytic systems, e.g. the effectiveness of different metal oxides in catalysing the decomposition of hydrogen peroxide into oxygen and water. • homogeneous and heterogeneous catalysts. • the relative economics of these reactions and other catalysed reactions with or without the catalyst, e.g. the Haber Process and the Contact process. • advantages and disadvantages of use of catalysts. • research and evaluate the conditions of chemical processes by considering the advantages and disadvantages of a process for making a chemical product. • consideration should be given to the economic and environmental factors as well as health and safety issues. <p>Student work – <i>Sample Assignment C</i></p>	<p>Teacher-produced materials and candidate-based research using book and electronic resources.</p> <p>(C.I.E.C.) Essential Plastics Industry.</p> <p>Use of video, DVD and other commercially produced audiovisual resources.</p> <p>Material obtained from companies involved in the petroleum and polymer industries.</p> <p>Material obtained from companies involved in bulk production of inorganic chemicals.</p> <p>www.catalysis-ed.org.uk/</p> <p><i>Sample Assignment C: Catalysts.</i></p>

Unit G624 - Assessment Evidence Grid

Unit G624: Chemicals for a purpose				
What the candidate needs to do:				
<p>The candidate needs to provide evidence of their knowledge, understanding and investigation into chemicals for a purpose [50 marks].</p> <p>This evidence needs to include:</p> <p>AO1: a description of two examples of inorganic and two examples of organic chemical compounds, discussing their chemical structure, properties and uses and a detailed account of the chemistry of two compounds (one of which is made from oil) [21];</p> <p>AO2: relevant research of one industrial process that involves the use of a catalyst, whose action the candidate will explain. The candidate's report will include an understanding of the social, economic and environmental impact of the product produced in the process [10];</p> <p>AO3: a sample and account of the preparation of two products that have been synthesized, purified and analyzed in the laboratory [19].</p>				
How the candidate will be assessed:				
Assessment Objective	Mark Band 1	Mark Band 2	Mark Band 3	Mark Awarded
AO1	Candidate will give four examples of chemical compounds (two inorganic and two organic) stating for each compound its <ul style="list-style-type: none"> • name • formula • structures; <p style="text-align: right;">[0 1]</p>	candidate will give four examples of chemical compounds (two inorganic and two organic), stating for each compound its <ul style="list-style-type: none"> • name • appropriate formula (e.g. displayed) • structures with a simple explanation of the bonding involved; the data will be presented systematically and research will show some evidence of selection; <p style="text-align: right;">[2 3]</p>	candidate will give four examples of chemical compounds (two inorganic and two organic) stating for each compound its <ul style="list-style-type: none"> • name • appropriate formula • structures to include a detailed explanation of the bonding involved; the candidate's research will show that relevant information has been selected and suitably referenced. <p style="text-align: right;">[4 5]</p>	
	For each of the four chosen compounds, candidate will present clearly the <ul style="list-style-type: none"> • uses • properties; <p style="text-align: right;">[0 1]</p>	for each of the four compounds, candidate will show <ul style="list-style-type: none"> • how the uses depend upon the properties; information will be clearly presented and research will show some evidence of selection; <p style="text-align: right;">[2 3]</p>	for each of the four compounds, candidate will show how the <ul style="list-style-type: none"> • properties depend upon structure • uses depend upon the properties using appropriate scientific terminology; information will be clearly presented and the candidate's research will show that relevant information has been selected and suitably referenced. <p style="text-align: right;">[4 5]</p>	

Unit G624: Chemicals for a purpose (continued)				
Assessment Objective	Mark Band 1	Mark Band 2	Mark Band 3	Mark Awarded
AO1	<p>Candidate will produce an account of the chemistry of two compounds, one of which is made from oil; the account will include</p> <ul style="list-style-type: none"> • physical properties • chemical properties • preparation • uses; <p>evidence of some scientific terminology used with corrected punctuation and grammar;</p> <p style="text-align: right;">[0 1 2 3 4 5]</p>	<p>candidate will produce a detailed account of the chemistry of two compounds, one of which is made from oil; the account will include</p> <ul style="list-style-type: none"> • physical properties • chemical properties • preparation • uses • relevant reactions; <p>appropriate scientific terminology will be used, mainly correct punctuation and grammar, and show that research information has been selected;</p> <p style="text-align: right;">[6 7 8]</p>	<p>candidate will produce a detailed account of the chemistry of two compounds, one of which is made from oil; the account will include</p> <ul style="list-style-type: none"> • physical properties • chemical properties • preparation • uses • structure of the compounds • explanation of relevant reactions; <p>the appropriate use of scientific terminology with correct spelling, punctuation and grammar and information selected is clearly presented and suitably referenced.</p> <p style="text-align: right;">[9 10 11]</p>	/21
	<p>Candidate will show evidence of completion of simple calculations of actual and theoretical yields;</p> <p style="text-align: right;">[0 1]</p>	<p>candidate will show evidence of completion of calculating percentage yields and calculating costs of producing chemicals;</p> <p style="text-align: right;">[2]</p>	<p>candidate will show evidence of completing to the appropriate degree of accuracy a number of simple and complex calculations using researched data on costs of chemicals and data obtained from at least one of the preparations.</p> <p style="text-align: right;">[3]</p>	
AO2	<p>Candidate will give an outline of one industrial process in which a catalyst is used; the outline will include</p> <ul style="list-style-type: none"> • the role of the catalyst • raw materials • products • conditions <p>and the usefulness of the product will be stated;</p> <p style="text-align: right;">[0 1 2]</p>	<p>candidate will give a detailed description of one industrial process in which a catalyst is used; the description will include</p> <ul style="list-style-type: none"> • the role of the catalyst • raw materials • products • conditions • chemical equations; <p>energy costs, waste products, availability and sustainability of raw materials will be considered;</p> <p style="text-align: right;">[3 4]</p>	<p>candidate will give a fully researched, detailed account of one industrial process in which a catalyst is used; the account will include</p> <ul style="list-style-type: none"> • a description and explanation of the role of the catalyst • raw materials • products • conditions • chemical equations; <p>the social, economic and environmental impact of the product will be discussed.</p> <p style="text-align: right;">[5 6 7]</p>	/10

Unit G624: Chemicals for a purpose (continued)				
Assessment Objective	Mark Band 1	Mark Band 2	Mark Band 3	Mark Awarded
AO3	Candidate will research the compound chosen and present evidence of the completion of a workable method with a safe risk assessment for the laboratory preparation of an <ul style="list-style-type: none"> • inorganic compound [1] • organic compound [1]; <p style="text-align: right;">[0 1 2]</p>	candidate will research the compound and present evidence of the confident completion of a detailed method with a safe risk assessment for the laboratory preparation of an <ul style="list-style-type: none"> • inorganic compound [2] • organic compound [2]; evidence of the completion of some basic analysis should be included; <p style="text-align: right;">[3 4]</p>	candidate will show suitable selected relevant research and present evidence of the accurate completion of a detailed method with a safe risk assessment for the laboratory preparation of an <ul style="list-style-type: none"> • inorganic compound [3] • organic compound [3] with evidence of purification and analysis included; the risk assessment must be detailed and accurate. <p style="text-align: right;">[5 6]</p>	
	Candidate will present observations and results for each preparation using tables and diagrams; candidate has suitably processed some results for <ul style="list-style-type: none"> • inorganic compound [1] • organic compound [2]; <p style="text-align: right;">[0 1 2 3]</p>	candidate will accurately record observations, measurements and results for each preparation; candidate has processed results for <ul style="list-style-type: none"> • inorganic compound [2] • organic compound [3]; <p style="text-align: right;">[4 5]</p>	candidate will accurately record all observations, measurements and results for each preparation and analysis; candidate will have accurately processed the results for <ul style="list-style-type: none"> • inorganic compound [3] • organic compound [4]. <p style="text-align: right;">[6 7]</p>	
	Candidate will evaluate the preparations and will indicate how the yield could be increased for <ul style="list-style-type: none"> • inorganic compound [1] • organic compound [1]; <p style="text-align: right;">[0 1 2]</p>	candidate will evaluate the preparations and analysis; candidate will state workable suggestions about increasing the yield for <ul style="list-style-type: none"> • inorganic compound [2] • organic compound [2]; <p style="text-align: right;">[3 4]</p>	candidate will evaluate systematically the preparations and analysis and give workable suggestions for increasing the yield for <ul style="list-style-type: none"> • inorganic compound [3] • organic compound [3]. <p style="text-align: right;">[5 6]</p>	/19
Total mark awarded:				/50