

**Year 11: Curriculum Intent**

**Year 11 Chemistry Essential Knowledge Summary**

Schemata 2: C7 Organic Chemistry	Schemata 3: C8 Chemical Analysis	Schemata 4: C9 Chemistry of the Atmosphere	Schemata 5: C10 Using Resources
<p><b>Composite Knowledge:</b> Pct.  <b>Component Knowledge:</b>  <b>Foundational Knowledge:</b>  <b>Declarative Knowledge:</b></p> <ul style="list-style-type: none"> <li>Be able to recognise substances as alkanes given their formulae in these forms.</li> <li>Describe the formation of crude oil.</li> <li>Describe the composition of crude oil.</li> <li>Define a hydrocarbon.</li> <li>Explain what is meant by the formula <math>C_n H_{2n+2}</math></li> <li>Make molecular models and work out general formula for the alkanes.</li> <li>Draw the covalent bonding in:               <ul style="list-style-type: none"> <li>methane</li> <li>ethane</li> <li>propane</li> <li>butane.</li> </ul> </li> <li>Define the term saturated</li> <li>Describe how fractional distillation works in terms of evaporation and condensation.</li> <li>Describe in general terms the conditions used for catalytic cracking and steam cracking.</li> <li>Recall the colour change when bromine water reacts with an alkene.</li> <li>Recall how boiling point, viscosity and flammability change with increasing molecular size.</li> <li>Write balanced equations for the complete combustion of hydrocarbons with a given formula.</li> <li>Knowledge of trends in properties of hydrocarbons is limited to:               <ul style="list-style-type: none"> <li>boiling points</li> <li>viscosity</li> <li>flammability.</li> </ul> </li> <li>Describe the balanced symbol equation including moles present, reactants and products.</li> <li>Describe the reaction including moles present, reactants and products.</li> <li>Describe what happens when any of the first four alcohols react with sodium, burn in air, are added to water, react with an oxidising agent.</li> <li>Recall the main uses of these alcohols.</li> <li>Know the conditions used for fermentation of sugar using yeast.</li> <li>Be able to recognise alcohols from their names or from given formulae.</li> <li>Describe what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols.</li> <li>(HT only)</li> <li>Recognise carboxylic acids from their names or from given formulae.</li> <li>Students do not need to know the names of individual carboxylic acids other than methanoic acid.</li> <li>Recognise addition polymers and monomers from diagrams in the forms shown and from</li> </ul>	<p><b>Composite Knowledge:</b> Ptes.  <b>Component Knowledge:</b>  <b>Foundational Knowledge:</b>  <b>Declarative Knowledge:</b></p> <ul style="list-style-type: none"> <li>Define the terms:               <ul style="list-style-type: none"> <li>pure substance</li> <li>compound.                   <ul style="list-style-type: none"> <li>Use data to identify pure and impure substances.</li> </ul> </li> <li>Identify the contents of mineral waters sold as 'pure'. Discuss the meaning of 'pure'.</li> <li>Define the terms:                   <ul style="list-style-type: none"> <li>mixture</li> <li>formulation.                       <ul style="list-style-type: none"> <li>Describe a method for paper chromatography.</li> </ul> </li> </ul> </li> <li>Describe what the <math>R_f</math> value is and instructions on how to calculate the <math>R_f</math> value.</li> <li>Devise a method for distinguishing between pure and impure substances using chromatography.</li> <li>Describe the tests for hydrogen, oxygen, chlorine and carbon dioxide.</li> <li>Describe the flame tests for identifying cations to another student.</li> <li>Describe how sodium hydroxide can be used to identify some cations to another student.</li> <li>Describe how dilute acids can be used to identify carbonates.</li> <li>Describe how silver nitrate can be used to identify halides.</li> <li>Describe how barium chloride in the presence of dilute hydrochloric acid can be used to identify sulfate ions.</li> <li>Describe the process of flame emission spectroscopy.</li> <li>Discuss the advantages and disadvantages of instrumental analysis versus test tube analysis.</li> <li>State advantages of instrumental methods compared with the chemical tests in this specification.</li> </ul> </li> </ul> <p><b>Procedural Knowledge:</b></p> <ul style="list-style-type: none"> <li>Be able to use melting point data to distinguish pure from impure substances.</li> <li>Interpret chromatograms and determine <math>R_f</math> values from chromatograms.</li> <li>Provide answers to an appropriate number of significant figures.</li> <li>Research how chemical analysis has been used to detect and solve crimes especially in forgery and murder by poisoning.</li> <li>Research how robotic spacecraft sent to investigate other planets analyse their atmospheres and surface materials using instrumentation.</li> <li>Research instrumental methods for detecting elements and compounds.</li> <li>Suggest advantages of the instrumental methods compared with the chemical tests.</li> </ul> <p><b>Upper Hierarchical Knowledge</b>            Explain, in terms of intermolecular forces, the terms:           <ul style="list-style-type: none"> <li>melting point</li> <li>boiling point.               <ul style="list-style-type: none"> <li>Explain what happens to substances during the process of chromatograph.</li> </ul> </li> </ul> </p>	<p><b>Composite Knowledge:</b> Ptes.  <b>Component Knowledge:</b>  <b>Foundational Knowledge:</b>  <b>Declarative Knowledge:</b></p> <ul style="list-style-type: none"> <li>Describe the composition of the atmosphere.</li> <li>Describe the approximate levels of gases in Earth's early atmosphere.</li> <li>Draw accurate pie charts for the composition of the atmosphere.</li> <li>Describe how sedimentary rocks formed and locked up carbon dioxide.</li> <li>Describe the main changes in the atmosphere over time and some of the likely causes of these changes.</li> <li>Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.</li> <li>Describe how sedimentary rocks formed and locked up carbon dioxide.</li> <li>Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.</li> <li>Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane.</li> <li>Evaluate the quality of evidence in a report about global climate change given appropriate information.</li> <li>Describe uncertainties in the evidence base.</li> <li>Describe how greenhouse gases are produced</li> <li>Describe briefly four potential effects of global climate change</li> <li>Identify the effects of global warming.</li> <li>Explain the effects of climate change.</li> <li>Describe what a carbon footprint is.</li> <li>Describe how emissions can be reduced. Suggest the consequences of the reductions on the Earth, atmosphere and everyday life.</li> <li>Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels</li> <li>Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used.</li> <li>Write word equations for complete and incomplete combustion.</li> </ul> <p><b>Procedural Knowledge:</b></p> <ul style="list-style-type: none"> <li>Given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere</li> <li>Describe the effect of greenhouse gases on wavelength.</li> <li>Compare the Earth's atmosphere to that of Mars and Venus.</li> <li>Discuss the scale, risk and environmental implications of global climate change.</li> <li>Use the internet to obtain numerical predictions for the effects of climate change. Using these predictions, suggest the possible effects on the Earth and</li> </ul>	<p><b>Composite Knowledge:</b> Ptes.  <b>Component Knowledge:</b>  <b>Foundational Knowledge:</b>  <b>Declarative Knowledge:</b></p> <ul style="list-style-type: none"> <li>State examples of natural products that are supplemented or replaced by agricultural and synthetic products.</li> <li>Distinguish between finite and renewable resources given appropriate information.</li> <li>Define the terms:               <ul style="list-style-type: none"> <li>finite</li> <li>renewable.                   <ul style="list-style-type: none"> <li>Distinguish between potable water and pure water.</li> <li>Describe the differences in treatment of ground water and salty water.</li> <li>Give reasons for the steps used to produce potable water.</li> <li>Define the terms:                       <ul style="list-style-type: none"> <li>potable water</li> <li>pure water.                           <ul style="list-style-type: none"> <li>Describe what a LCA is using a suitable example.</li> <li>Discuss the negative issues relating to LCAs and why caution should be used when using them</li> <li>Define the following terms using suitable examples:                               <ul style="list-style-type: none"> <li>corrosion</li> <li>rusting</li> <li>sacrificial protection.                                   <ul style="list-style-type: none"> <li>Describe how to prevent corrosion using the examples:                                       <ul style="list-style-type: none"> <li>oxide coating on aluminium</li> <li>zinc on iron</li> <li>magnesium on steel.   <ul style="list-style-type: none"> <li>Use suitable examples to explain why corrosion can be prevented using barriers and the role of sacrificial barriers if appropriate to the example used.</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>Describe experiments and interpret results to show that both air and water are necessary for rusting.</li> <li>Recall a use of each of the alloys specified</li> <li>Interpret and evaluate the composition and uses of alloys other than those specified, given appropriate information.</li> <li>Define the terms:                   <ul style="list-style-type: none"> <li>alloy</li> <li>high carbon steel</li> <li>low carbon steel.                       <ul style="list-style-type: none"> <li>Explain how low density and high density poly(ethene) are both produced from ethene.</li> <li>Explain the difference between thermosoftening and thermosetting polymers in terms of their structures.</li> </ul> </li> </ul> </li> <li>Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals.</li> <li>Recall a source for the nitrogen and a source for the hydrogen used in the Haber process.</li> <li>State where the raw materials in the Haber process come from.</li> <li>Describe the process for manufacturing ammonia.</li> <li>Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li></ul>

<p>the presence of the functional group -C=C- in the monomers.</p> <ul style="list-style-type: none"> <li>Draw diagrams to represent the formation of a polymer from a given alkene monomer.</li> <li>Relate the repeating unit to the monomer.</li> <li>Explain the basic principles of condensation polymerisation by reference to the functional groups in the monomers and the repeating units in the polymers.</li> <li>Be able to name the types of monomers from which these naturally occurring polymers are made.</li> <li>Describe the structure of DNA in terms of two polymer chains and nucleotides.</li> </ul> <p><b>Procedural Knowledge:</b></p> <ul style="list-style-type: none"> <li>Plot boiling points of alkanes against number of carbons.</li> <li>Explain how fractional distillation works in terms of evaporation and condensation.</li> <li>Balance chemical equations as examples of cracking given the formulae of the reactants and products.</li> <li>Research uses of common alkenes.</li> <li>Give examples to illustrate the usefulness of cracking.</li> <li>Be able to explain how modern life depends on the uses of hydrocarbons.</li> <li>Explain what is meant by the formula <math>C_n H_{2n}</math></li> <li>Write balanced symbol equations for the combustion of alkenes in oxygen.</li> <li>Write the reaction between an alkene and hydrogen, giving suitable examples.</li> <li>Write the reaction between an alkene and water, giving suitable examples.</li> </ul> <p><b>Upper Hierarchical Knowledge</b></p> <ul style="list-style-type: none"> <li>Make predictions of the boiling points of other alkanes.</li> <li>Suggest the impact on fuels, feedstocks and petrochemicals of the depleting stocks of crude oil.</li> <li>Explain the properties of hydrocarbons in relation to intermolecular forces.</li> <li>Write balanced symbol equations for the combustion of hydrocarbon fuels.</li> <li>Describe the balanced symbol equation including moles present, long alkane reactant, specific reaction conditions, and alkene and short alkane products.</li> <li>Draw the covalent bonding in: <ul style="list-style-type: none"> <li>ethene</li> <li>propene</li> <li>butene</li> <li>pentene. <ul style="list-style-type: none"> <li>Explain why carboxylic acids are weak acids in terms of ionisation and pH.</li> </ul> </li> </ul> </li> </ul> <p>Draw the covalent bonding in:</p> <ul style="list-style-type: none"> <li>methanoic acid</li> <li>ethanoic acids</li> <li>propanoic acid</li> <li>butanoic acid.</li> </ul> <p>Describe what happens to one of the first four acids during the reactions:</p> <ul style="list-style-type: none"> <li>dissolving in water to produce acidic solutions</li> <li>reacting with carbonates to produce carbon dioxide</li> <li>not ionising completely when dissolved in water (they are weak acids)</li> </ul>	<ul style="list-style-type: none"> <li>Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances.</li> <li>Be able to write balanced equations for the reactions to produce the insoluble hydroxides.</li> <li>Explain what happens to a sample throughout the process of flame emission spectroscopy.</li> <li>Interpret instrumental results for flame emission spectroscopy.</li> <li>Compare these to chemical tests carried out in this specification.</li> </ul> <p><b>Working Scientifically</b></p> <ul style="list-style-type: none"> <li>Research the melting and boiling points of common pure substances and compounds.</li> <li>Suggest reasons for differences in data available on the internet.</li> <li>Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R<sub>f</sub> values.</li> <li>Carry out tests for hydrogen, oxygen, carbon dioxide and chlorine.</li> <li>Carry out flame tests on the following cations: <ul style="list-style-type: none"> <li>lithium</li> <li>sodium</li> <li>potassium</li> <li>calcium</li> <li>copper. <ul style="list-style-type: none"> <li>Use sodium hydroxide to test for the following cations: <ul style="list-style-type: none"> <li>aluminium</li> <li>calcium</li> <li>magnesium</li> <li>copper(II)</li> <li>iron(II)</li> <li>iron(III). <ul style="list-style-type: none"> <li>Use dilute acid to test for the following carbonates: <ul style="list-style-type: none"> <li>sodium carbonate</li> <li>potassium carbonate.</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>Analyse the composition of an egg shell, testing for the presence of various ions using acids and other test tube reactions and flame tests.</li> <li>Interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set in the same form.</li> <li>Use of chemical tests to identify the ions in unknown single ionic compounds.</li> </ul>	<p>atmosphere should the predictions become reality.</p> <ul style="list-style-type: none"> <li>Suggest the consequences of the reductions on the Earth, atmosphere and everyday life.</li> <li>Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used.</li> <li>Describe the effect of the following products: <ul style="list-style-type: none"> <li>Carbon monoxide on the human body.</li> <li>Sulfur dioxide and oxides of nitrogen on acidity of rain water.</li> <li>Sulfur dioxide and oxides of nitrogen on respiratory system.</li> <li>Particulates on global dimming.</li> <li>Particulates on human health problems.</li> </ul> </li> </ul> <p><b>Upper Hierarchical Knowledge</b></p> <ul style="list-style-type: none"> <li>Extended writing: describe the theory of the evolution of the Earth's early atmosphere.</li> <li>Extended writing: explain why the composition of the atmosphere has changed over billions of years.</li> <li>Compare the Earth's atmosphere to that of Mars and Venus.</li> <li>Extended writing: explain how algae and plants have caused the concentrations of oxygen in the atmosphere to increase.</li> <li>Extended writing: explain how algae and plants have caused the concentrations of carbon dioxide in the atmosphere to decrease.</li> <li>Grade 9: explain why the wavelength changes due to greenhouse gases.</li> <li>Evaluate the quality of evidence in a report about global climate change given appropriate information.</li> <li>Describe how greenhouse gases are produced.</li> <li>Evaluate the use of models for predicting climate change.</li> <li>Use these equations to describe the reactions in terms of reactants, products made and number of each present.</li> <li>Explain why the following can be produced in combustion: <ul style="list-style-type: none"> <li>carbon dioxide</li> <li>carbon monoxide</li> <li>soot</li> <li>water vapour</li> <li>sulfur dioxide</li> <li>oxides of nitrogen.</li> </ul> </li> </ul> <p><b>Working Scientifically</b></p> <ul style="list-style-type: none"> <li>Show that aquatic plants (eg Elodea) produce oxygen in daylight.</li> <li>Use the internet to obtain data for concentrations of greenhouse gases.</li> <li>Evaluate the reliability of the data available on the internet.</li> <li>Research the process of peer review in reporting results/data.</li> <li>Use data to calculate your own carbon footprint over a period/holiday. Suggest the effects on Earth and atmosphere of the calculated carbon footprint.</li> <li>Use shells and acid to show how pollution can cause shells to corrode.</li> </ul>	<ul style="list-style-type: none"> <li>Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.</li> </ul> <p><b>Procedural Knowledge:</b></p> <ul style="list-style-type: none"> <li>Extract and interpret information about resources from charts, graphs and tables.</li> <li>Use orders of magnitude to evaluate the significance of data.</li> <li>Evaluate the impacts and benefits of biological methods of extracting meta</li> <li>Research information for the processes of: <ul style="list-style-type: none"> <li>phytomining</li> <li>bioleaching. <ul style="list-style-type: none"> <li>Include percentage of metal extracted, concentration of global warming gases released, amount of electricity used etc.</li> </ul> </li> </ul> </li> </ul> <p>Use this data in an evaluation.</p> <ul style="list-style-type: none"> <li>Use information to interpret the LCA of a given material or product.</li> <li>Explain sacrificial protection in terms of relative reactivity.</li> <li>Using diagrams, describe the difference between metals and their alloys</li> <li>Research the first alloy to include the history of it and its uses.</li> <li>Model an alloy using different size marbles. Use this model to discuss the properties of alloys.</li> <li>Describe how the following are produced and give uses for each: <ul style="list-style-type: none"> <li>soda-lime glass</li> <li>borosilicate glass</li> <li>clay ceramics</li> <li>low-density poly(ethene)</li> <li>high density poly(ethene)</li> <li>composites. <ul style="list-style-type: none"> <li>Using diagrams, describe the structure of the following polymers: <ul style="list-style-type: none"> <li>thermosoftening</li> <li>thermosetting. <ul style="list-style-type: none"> <li>Use these diagrams and descriptions to explain why the following happens when heated: <ul style="list-style-type: none"> <li>thermosoftening polymers melt</li> <li>thermosetting polymers do not melt. <ul style="list-style-type: none"> <li>Extended writing: compare how fertilisers are produced in industry and in the laboratory.</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>Investigate what was used as fertilizer before the industrial preparation of fertilisers was invented.</li> </ul> <p><b>Upper Hierarchical Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain the differences between the two terms using suitable examples.</li> <li>Explain the differences between the two terms.</li> <li>Extended writing: describe the process of desalination.</li> <li>Extended writing: describe the process of distillation</li> <li>Extended writing: explain why distillation separates substances.</li> <li>Explain what happens to substances during the process of distillation in terms of intermolecular forces of attraction.</li> <li>Extended writing: describe the processes of <ul style="list-style-type: none"> <li>phytomining</li> <li>bioleaching. <ul style="list-style-type: none"> <li>Evaluate ways of reducing the use of limited resources, given appropriate information.</li> </ul> </li> <li>Extended writing: describe the environmental impacts of obtaining raw materials from the Earth.</li> </ul> </li> </ul>
---	---	---	---

<ul style="list-style-type: none"> <li>• reacting with alcohols in the presence of an acid catalyst to produce esters, for example ethanoic acid reacts with ethanol to produce ethyl ethanoate and water.</li> <li>• Describe what takes place during condensation polymerisation.</li> <li>• Identify monomers, polymers and repeating units.</li> <li>•</li> <li>• Describe the polymerisation of ethane-1,2-diol and hexanedioic acid.</li> </ul> <p><b>Working Scientifically</b></p> <ul style="list-style-type: none"> <li>• Investigate the properties of different hydrocarbons in terms of boiling point, viscosity and flammability with increasing molecular size.</li> <li>• Identify the products of combustion of alkanes.</li> <li>• Demo or practical: crack paraffin over porous clay pot.</li> <li>• Use bromine water to identify alkenes.</li> <li>• Test for unsaturation in other compounds.</li> <li>• Research uses of the first four carboxylic acids.</li> <li>• Research some of the uses of esters and try to work out the alcohols and carboxylic acids used to make them.</li> <li>• Opportunities within investigation of the reactions of carboxylic acids.</li> <li>• Use models to represent condensation polymerisation.</li> <li>• Research common polyesters and their uses.</li> <li>• Research common amino acids and polypeptides, and polypeptide uses</li> <li>• Research the history of the discovery of DNA as a polymer chain.</li> <li>• Research naturally occurring polymers and their uses</li> </ul>			<ul style="list-style-type: none"> <li>• Describe how to prevent corrosion using the examples:</li> <li>• oxide coating on aluminium</li> <li>• zinc on iron</li> <li>• magnesium on steel.</li> <li>• Use suitable examples to explain why corrosion can be prevented using barriers and the role of sacrificial barriers if appropriate to the example used.</li> <li>• State properties of examples of alloys. Explain, in relation to the structure, why these alloys have these properties.</li> </ul> <p>Research the physical properties of:</p> <ul style="list-style-type: none"> <li>• soda-lime glass</li> <li>• borosilicate glass</li> <li>• clay ceramics</li> <li>• low-density poly(ethene)</li> <li>• high density poly(ethene)</li> <li>• composites</li> </ul> <p>Use these properties to explain how the materials are related to their use. Compare the properties of thermosetting and thermosoftening polymers.</p> <ul style="list-style-type: none"> <li>• Using diagrams, describe the structure of the following polymers:</li> <li>• thermosoftening</li> <li>• thermosetting. <ul style="list-style-type: none"> <li>• Use these diagrams and descriptions to explain why the following happens when heated:</li> </ul> </li> <li>• thermosoftening polymers melt</li> <li>• thermosetting polymers do not melt. <ul style="list-style-type: none"> <li>• (HT only) Interpret graphs of reaction conditions versus rate.</li> <li>• (HT only) Apply the principles of dynamic equilibrium to the Haber process.</li> <li>• (HT only) Explain the trade-off between rate of production and position of equilibrium.</li> <li>• (HT only) Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.</li> <li>• Write a balanced symbol equation for the manufacture of ammonia. Use this to describe the reaction in terms of reactants, products, conditions and number of moles. <ul style="list-style-type: none"> <li>• Recall the following topics:</li> </ul> </li> </ul> </li> <li>• dynamic equilibrium</li> <li>• temperature affecting the rate of a reaction</li> <li>• pressure. <ul style="list-style-type: none"> <li>• Explain how each of these affects the Haber process reaction.</li> <li>• Discuss the effect of the following conditions on the reaction: <ul style="list-style-type: none"> <li>• a high temperature</li> <li>• a low temperature <ul style="list-style-type: none"> <li>• a high pressure</li> <li>• a low pressure</li> <li>• use of a catalyst</li> <li>• no catalyst.</li> </ul> </li> <li>• Discuss the pros and cons of these varying conditions.</li> <li>• Explain the trade-off between the rate of the reaction and the position of the equilibrium.</li> </ul> </li> <li>• Explain how the conditions used in industry affect the equilibrium position, rate and costs of the reaction.</li> </ul> <p><b>Working Scientifically</b></p> <ul style="list-style-type: none"> <li>• Research examples of natural products that are supplemented or replaced by agricultural and synthetic products.</li> </ul> </li></ul>
---	--	--	--

			<ul style="list-style-type: none"> <li>• Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.</li> <li>• Research how water is treated.</li> <li>• Model phytomining in the laboratory by watering geraniums with dilute copper sulphate for a period of time. The leaves can be burnt and copper can be extracted from the ash by rinsing in dilute hydrochloric acid and electrolysis of the solution.</li> <li>• Use the internet to carry out simple comparative LCAs for shopping bags made from plastic and paper.</li> <li>• Use the internet to carry out simple comparative LCAs for shopping bags made from plastic and paper.</li> <li>• Research methods of producing/obtaining metal/glass/building materials/clay ceramics/plastics. Identify in these methods the limited resources that are used to generate the energy.</li> <li>• Research how glass is recycled.</li> <li>• Research how metal is recycled and alternatives for use of scrap metals ie in obtaining iron in a blast furnace.</li> <li>• Investigate the conditions for rusting of iron nails in test tubes.</li> <li>• Research the physical properties of: <ul style="list-style-type: none"> <li>• soda-lime glass</li> <li>• borosilicate glass</li> <li>• clay ceramics</li> <li>• low-density poly(ethene)</li> <li>• high density poly(ethene)</li> <li>• composites <ul style="list-style-type: none"> <li>• Research the availability and cost of the raw materials and energy supplies in the Haber process. Explain how these relate to the conditions used for the Haber process in industry.</li> </ul> </li> </ul> </li> <li>• Research compositions of NPK and their uses.</li> <li>• Research how fertilisers can be prepared: <ul style="list-style-type: none"> <li>• industrially</li> <li>• in a laboratory.</li> </ul> </li> </ul>
--	--	--	--