



# Chemistry Academic Overview 2018-2019

Science						
	Term 1.1	Term 1.2	Term 2.1	Term 2.2	Term 3.1	Term 3.2
Year 9	States of Matter Methods of Separating and Purifying Substances Atomic Structure The Periodic Table	Ionic Bonding Covalent Bonding Types of Substance	Acids	Calculations Involving Masses Electrolytic Processes Obtaining and Using Metals	Reversible Reactions and Equilibria Groups In The Periodic Table Fuels and Earth Science	Rates of Reactions and Energy Changes End of Year Assessment Preparation and Feedback
Year 10	Year 9 Re-cap Quantitative analysis	Dynamic equilibria Qualitative analysis: tests for ions	Hydrocarbons Polymers	Alcohols and carboxylic acids	Bulk and surface properties of matter including nanoparticles	End of Year Assessment Preparation and Feedback
Year 11	Catch-up and Examination Preparation	Catch-up and Examination Preparation	PPE 1 Feedback and Revision	PPE 2 Preparation and Feedback	Revision For GCSE Examinations	



ERASMUS DARWIN ACADEMY

*Excellence for All*





## Year 11 Chemistry Curriculum Content Overview 2018-2019

<b>Knowledge and Skills</b> <b>Students will be taught to....</b>	<b>Reading, Oracy, Literacy and Numeracy</b>	<b>Assessment</b>
<ul style="list-style-type: none"> <li>Recall and be able to write word, balanced symbol, ionic and half equations</li> <li>Recall the formulae of elements, simple compounds and ions</li> <li>Use and identify state symbols in chemical equations and describe the use of hazard symbols on containers</li> <li>Analyse and interpret information presented in a variety of forms including graphs, tables and written text</li> <li>Carry out practical activities in order to obtain results and explain their findings using correct scientific principles</li> <li>For each core practical explain; what equipment is used, how to carry out the practical, what is being changed (independent variable), what is being measured (dependent variable), what is being controlled and why</li> <li>Explain how electroplating can be used to improve the appearance and/or the resistance to corrosion of metal objects</li> <li>Carry out simple calculations using the results of titrations to calculate an unknown concentration of a solution or an unknown volume of solution required</li> <li>Evaluate the strengths and weaknesses of fuel cells for given uses</li> <li>Explain why the test for any ion must be unique</li> <li>Describe how to carry out the test for ions</li> <li>Recall the formulae of molecules of the alkanes, methane, ethane, propane and butane, and draw the structures of these molecules, showing all covalent bonds</li> <li>Describe how other addition polymers can be made by combining together other monomer molecules</li> <li>Recall the formulae of molecules of alcohols and carboxylic acids</li> <li>Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens</li> </ul>	<p style="text-align: center;"><b>Reading</b></p> <ul style="list-style-type: none"> <li>Edexcel combined science text book</li> <li>Recommended reading texts</li> <li>CGP revision guide</li> <li>PLC checklists</li> </ul>	<p style="text-align: center;"><b>Formative</b></p> <ul style="list-style-type: none"> <li>Questioning in lessons</li> <li>Live student performance in lessons followed by questions</li> <li>Whole class feedback during lessons</li> <li>Regular peer and self assessment</li> <li>Book checks for general presentation, work completion and spellings</li> <li>Low stakes quizzing</li> <li>Learning checkpoints in between main assessments</li> </ul> <p style="text-align: center;"><b>Summative</b></p> <ul style="list-style-type: none"> <li>3 cumulative assessments throughout the year</li> </ul>
	<p style="text-align: center;"><b>Numeracy</b></p> <ul style="list-style-type: none"> <li>Recall of key values and quantities</li> <li>Recall, use and application of equations</li> <li>Conversion between units</li> <li>Working with numbers in standard form</li> <li>Drawing appropriate graphs and tables with suitable scales/ headings and plotting/ recording data</li> <li>Describing mathematical patterns in experimental data and explaining them using scientific concepts</li> <li>Perform calculations based on extracting data from both tables and graphs</li> </ul>	
	<p style="text-align: center;"><b>Oracy and Literacy</b></p> <ul style="list-style-type: none"> <li>Key words</li> <li>Writing a method for core practicals</li> <li>Six mark questions</li> </ul>	



# Assessment Skills, Knowledge and Concepts Map

Key learning questions	Edexcel Chemistry Year 11 Assessment Phase 1
	Quantitative analysis
<ul style="list-style-type: none"><li><input type="checkbox"/> Give one property of transition metals that makes them useful in industrial processes.</li><li><input type="checkbox"/> Why are pure metals not strong enough for many uses?</li><li><input type="checkbox"/> Why are alloys harder than pure metals?</li><li><input type="checkbox"/> Which two substances need to be present for iron to rust?</li><li><input type="checkbox"/> What is electroplating?</li><li><input type="checkbox"/> Why isn't Universal indicator a suitable indicator to use in a titration?</li><li><input type="checkbox"/> Describe how an acid should be added from a burette to an alkali in a flask when a titration is near its end-point</li><li><input type="checkbox"/> What is the yield of a reaction?</li><li><input type="checkbox"/> Give the formula used to calculate the percentage yield of a reaction.</li><li><input type="checkbox"/> Give three reasons why percentage yields are never 100%</li><li><input type="checkbox"/> What is the atom economy of a reaction?</li><li><input type="checkbox"/> Give the equation used to find the atom economy of a reaction</li><li><input type="checkbox"/> Give two reasons why reactions with high atom economies are preferred for use in industry over those with low atom economies</li><li><input type="checkbox"/> State the formula for calculating molar volume</li><li><input type="checkbox"/> Give two examples of elements that plants require to grow</li><li><input type="checkbox"/> What is a fuel cell?</li><li><input type="checkbox"/> Name the substance produced during the reaction in a hydrogen-oxygen fuel cell</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Recall that most metals are transition metals and describe their typical properties</li><li><input type="checkbox"/> Recall that the oxidation of metals results in corrosion</li><li><input type="checkbox"/> Explain how rusting of iron can be prevented</li><li><input type="checkbox"/> Explain how electroplating can be used to improve the appearance and/or the resistance to corrosion of metal objects</li><li><input type="checkbox"/> Explain, using models, why converting pure metals into alloys often increases the strength of the product</li><li><input type="checkbox"/> Explain why iron is alloyed with other metals to produce alloy steels</li><li><input type="checkbox"/> Explain how the uses of metals are related to their properties (and vice versa) for AL, CU, Ag and alloys inc: magnalium and brass</li><li><input type="checkbox"/> Calculate the concentration of solutions in mol dm<sup>-3</sup> and convert concentration in g dm<sup>-3</sup> into mol dm<sup>-3</sup> and vice versa</li><li><input type="checkbox"/> Core Practical: Carry out an accurate acid-alkali titration, using burette, pipette and a suitable indicator</li><li><input type="checkbox"/> Carry out simple calculations using the results of titrations to calculate an unknown concentration/volume of a solution</li><li><input type="checkbox"/> Calculate the percentage yield of a reaction from the actual yield and the theoretical yield</li><li><input type="checkbox"/> Describe that the actual yield of a reaction is usually less than the theoretical yield and that the causes of this</li><li><input type="checkbox"/> Recall the atom economy of a reaction forming a desired product</li><li><input type="checkbox"/> Calculate the atom economy of a reaction forming a desired product</li><li><input type="checkbox"/> Explain why a particular reaction pathway is chosen to produce a specified product</li><li><input type="checkbox"/> Describe what the molar volume, of any gas at room temperature and pressure is</li><li><input type="checkbox"/> Use the molar volume and balanced equations in calculations involving the masses of solids and volumes of gases</li><li><input type="checkbox"/> Use Avogadro's law to calculate volumes of gases involved in a gaseous reaction, given the relevant equation</li><li><input type="checkbox"/> Describe what the Haber process is</li><li><input type="checkbox"/> Predict how the rate of attainment of equilibrium is affected by: changes in temperature, pressure, concentration and use of a catalyst</li><li><input type="checkbox"/> Explain how, in industrial reactions, including the Haber process, conditions used are related to cost, energy and acceptable yield</li><li><input type="checkbox"/> Name the elements (in compound form) fertilisers may contain to promote plant growth</li><li><input type="checkbox"/> Describe how ammonia reacts with nitric acid to produce a salt that is used as a fertiliser</li><li><input type="checkbox"/> Describe and compare the laboratory and industrial production of ammonium sulfate</li><li><input type="checkbox"/> Recall that a chemical cell produces a voltage until what happens</li><li><input type="checkbox"/> Recall that in a hydrogen-oxygen fuel cell hydrogen and oxygen are used to produce a voltage and name the only product</li><li><input type="checkbox"/> Evaluate the strengths and weaknesses of fuel cells for given uses</li></ul>
Key learning questions	Dynamic equilibria and Qualitative analysis: tests for ions



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| <ul style="list-style-type: none"><li><input type="checkbox"/> Write the word and balanced symbol equation for the Haber process</li><li><input type="checkbox"/> Describe how to do a flame test</li><li><input type="checkbox"/> Give the name of the two metals that will form a white precipitate when sodium hydroxide solution is added to a solution containing a compound of the metal</li><li><input type="checkbox"/> Which of the precipitates will redissolve when excess sodium hydroxide is added?</li><li><input type="checkbox"/> What gas is produced when hydrochloric acid is added to a solution of carbonate ions?</li><li><input type="checkbox"/> Describe how you would test for the gas in the question above</li><li><input type="checkbox"/> Describe how to test a solution to see if it contains bromide ions</li><li><input type="checkbox"/> Other than identify metal ions, what other information can flame photometry provide?</li><li><input type="checkbox"/> Give an advantage of flame photometry over conducting flame tests</li></ul> | <ul style="list-style-type: none"><li><input type="checkbox"/> Recall that chemical reactions are reversible, the use of the symbol <math>\rightleftharpoons</math> in equations and how the direction of some reversible reactions can be altered</li><li><input type="checkbox"/> Explain what is meant by dynamic equilibrium</li><li><input type="checkbox"/> Describe the formation of ammonia as a reversible reaction in the Haber process</li><li><input type="checkbox"/> Recall the conditions for the Haber process</li><li><input type="checkbox"/> Predict how the position of a dynamic equilibrium is affected by changes in temperature, pressure and concentration</li><li><input type="checkbox"/> Explain why the test for any ion must be unique</li><li><input type="checkbox"/> Describe flame tests to identify the following ions in solids: Li<sup>+</sup>, Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Cu<sup>2+</sup> including the colours of the flames</li><li><input type="checkbox"/> Describe tests to identify the following ions: Al<sup>3+</sup>, Ca<sup>2+</sup>, Cu<sup>2+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, NH<sub>4</sub> using NaOH solution</li><li><input type="checkbox"/> Describe the chemical test for ammonia</li><li><input type="checkbox"/> Describe tests to identify the following ions: CO<sub>3</sub><sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup></li><li><input type="checkbox"/> Core Practical: Identify the ions in unknown salts, using the tests for the specified cations and anions in the specification</li><li><input type="checkbox"/> Identify the ions in unknown salts, using results of the tests stated</li><li><input type="checkbox"/> Describe that instrumental methods of analysis are available and that these may improve sensitivity, accuracy and speed of tests</li><li><input type="checkbox"/> Evaluate data from a flame photometer to determine the concentration of ions in dilute solution using a calibration curve</li><li><input type="checkbox"/> Evaluate data from a flame photometer to identify metal ions by comparing the data with reference data</li><li><input type="checkbox"/> To identify metal ions by comparing the data with reference data</li></ul> |
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Key learning questions	Edexcel Chemistry Year 11 Assessment Phase 2
	Hydrocarbons and Polymers
<ul style="list-style-type: none"><li><input type="checkbox"/> Draw the structure of propane</li><li><input type="checkbox"/> Explain why alkanes are described as saturated</li><li><input type="checkbox"/> Draw the structure of ethane, showing all covalent bonds</li><li><input type="checkbox"/> What kind of reaction happens between alkenes and bromine?</li><li><input type="checkbox"/> What are the products of the complete combustion of hydrocarbons?</li><li><input type="checkbox"/> What is a polymer?</li><li><input type="checkbox"/> Name the monomer used to make (poly)ethane</li><li><input type="checkbox"/> State the properties of PVC and suggest why it is used to make water pipes</li><li><input type="checkbox"/> What is the minimum number of functional groups a molecule must have to undergo condensation polymerisation?</li><li><input type="checkbox"/> How many different types of monomers are present in DNA?</li><li><input type="checkbox"/> What type of monomer are proteins based on?</li><li><input type="checkbox"/> Name the functional group contained in the monomer from the above question</li><li><input type="checkbox"/> What is the main starting material used to make plastics?</li><li><input type="checkbox"/> Give an advantage of disposing of plastics by combustion</li><li><input type="checkbox"/> Give two ways recycling helps to reduce the impact of polymers on the environment</li><li><input type="checkbox"/> Give one way in which recycling polymers damages the environment</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Recall the formulae of molecules of the alkanes, methane, ethane, propane and butane, and draw the structure of these</li><li><input type="checkbox"/> Explain why the alkanes are saturated hydrocarbons</li><li><input type="checkbox"/> Recall the formulae of molecules of the alkenes, ethene, propene, butene, and draw the structures (but-1-ene and but-2-ene only)</li><li><input type="checkbox"/> Explain why the alkenes are unsaturated hydrocarbons</li><li><input type="checkbox"/> Recall the addition reaction of ethene with bromine, showing the structures of reactants and products, and extend this to other alkenes</li><li><input type="checkbox"/> Explain how bromine water is used to distinguish between alkanes and alkenes</li><li><input type="checkbox"/> Describe how the complete combustion of alkanes and alkenes involves the oxidation of the hydrocarbons, name the products</li><li><input type="checkbox"/> Recall that a polymer is a substance of high average relative molecular mass made up of small repeating units</li><li><input type="checkbox"/> Describe how ethene molecules can combine together in a polymerisation reaction</li><li><input type="checkbox"/> Describe that the addition polymer formed is called polyethene</li><li><input type="checkbox"/> Describe how other addition polymers can be made by combining together other monomer molecules containing C=C</li><li><input type="checkbox"/> Describe how to deduce the structure of a monomer from the structure of an addition polymer and vice versa</li><li><input type="checkbox"/> Explain how the uses of polymers are related to their properties and vice versa</li><li><input type="checkbox"/> HT - Explain why polyesters are condensation polymers</li><li><input type="checkbox"/> HT - Explain how a polyester is formed when a monomer molecule containing two carboxylic acid groups is reacted with a monomer molecule containing two alcohol groups</li><li><input type="checkbox"/> HT Explain how a molecule of water is formed each time an ester link is formed</li><li><input type="checkbox"/> Describe some problems associated with polymers including the availability of starting materials</li><li><input type="checkbox"/> Describe the advantages and disadvantages of recycling polymers, including economic implications, availability of starting materials and environmental impact</li><li><input type="checkbox"/> Recall that DNA is a polymer made from four different monomers called nucleotides</li><li><input type="checkbox"/> Recall that starch is a polymer based on sugars</li><li><input type="checkbox"/> Recall that proteins are polymers based on amino acids</li></ul>



<b>Key learning questions</b>	<b>Alcohols and Carboxylic Acids</b>



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| <ul style="list-style-type: none"><li><input type="checkbox"/> What is the general formula for alcohols?</li><li><input type="checkbox"/> Name the first four alcohols</li><li><input type="checkbox"/> What is the chemical formula for propanol?</li><li><input type="checkbox"/> Draw the structure of methanol</li><li><input type="checkbox"/> Write the word equation for the process of fermentation</li><li><input type="checkbox"/> State the role of yeast in fermentation</li><li><input type="checkbox"/> Describe and explain the conditions needed for fermentation</li><li><input type="checkbox"/> Name the first four carboxylic acids</li><li><input type="checkbox"/> Draw the structure of methanoic acid</li><li><input type="checkbox"/> Suggest the product of the oxidation of propanol</li></ul> | <ul style="list-style-type: none"><li><input type="checkbox"/> Recall the formulae of molecules of the alcohols, methanol, ethanol, propanol and butanol, and draw the structures of these molecules, showing all covalent bonds</li><li><input type="checkbox"/> Recall that the functional group in alcohols is <math>-OH</math></li><li><input type="checkbox"/> Core Practical: Investigate the temperature rise produced in a known mass of water by the combustion of the alcohols ethanol, propanol, butanol and pentanol</li><li><input type="checkbox"/> Recall the formulae of molecules of the carboxylic acids, methanoic, ethanoic, propanoic and butanoic acids, and draw the structures of these molecules, showing all covalent bonds</li><li><input type="checkbox"/> Recall that the functional group in carboxylic acids is <math>-COOH</math></li><li><input type="checkbox"/> Recall that ethanol can be oxidised to produce ethanoic acid and extend this to other alcohols</li><li><input type="checkbox"/> Recall members of a given homologous series have similar reactions because their molecules contain the same functional group and use this to predict the products of other in series</li><li><input type="checkbox"/> Describe the production of ethanol by fermentation of carbohydrates in aqueous solution, using yeast to provide enzymes</li><li><input type="checkbox"/> Explain how to obtain a concentrated solution of ethanol by fractional distillation of the fermentation mixture</li></ul> |
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Key learning questions	Edexcel Chemistry Year 11 Assessment Phase 3
	Bulk and surface properties of matter including nanoparticles
<ul style="list-style-type: none"><li><input type="checkbox"/> What is the size range for nanoparticles in metres? Give your answer in standard form</li><li><input type="checkbox"/> Why do nanoparticles often behave differently to the bulk material</li><li><input type="checkbox"/> What property of nanoparticles gives them the potential to be used as catalysts?</li><li><input type="checkbox"/> Give one way nanoparticles could be used in medicine</li><li><input type="checkbox"/> What property do some nanoparticles have which means they can be used in electronics?</li><li><input type="checkbox"/> Give one advantage of using nanoparticles in sunscreens over traditional ingredients</li><li><input type="checkbox"/> Give one possible disadvantage of using nanoparticles in sunscreens</li><li><input type="checkbox"/> Why are properties of polymers so varied?</li><li><input type="checkbox"/> Why is clay an ideal material for making bricks?</li><li><input type="checkbox"/> What is a composite material?</li><li><input type="checkbox"/></li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Compare the size of nanoparticles with the sizes of atoms and molecules</li><li><input type="checkbox"/> Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens</li><li><input type="checkbox"/> Explain the possible risks associated with some nanoparticulate materials</li><li><input type="checkbox"/> Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals</li><li><input type="checkbox"/> Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens</li><li><input type="checkbox"/> Explain the possible risks associated with some nanoparticulate materials</li><li><input type="checkbox"/> Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals</li><li><input type="checkbox"/> Explain why the properties of a material make it suitable for a given use and use data to select materials appropriate for specific uses</li></ul>