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	

Year 10 Chemistry Curriculum Content Overview 2018-2019

Knowledge and Skills Students will be taught to….	Reading, Oracy, Literacy and Numeracy	Assessment
• Recall and be able to write word, balanced symbol, ionic and half equations • Recall the formulae of elements, simple compounds and ions • Use and identify state symbols in chemical equations and describe the use of hazard symbols on containers • Analyse and interpret information presented in a variety of forms including graphs, tables and writen text • Carry out practical activities in order to obtain results and explain their findings using correct scientific principles • For each core pracical 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 • Explain how electroplating can be used to improve the appearance and/or the resistance to corrosion of metal objects • Carry out simple calculations using the results of titrations to calculate an unknown concentration of a solution or an unknown volume of solution required • Evaluate the strengths and weaknesses of fuel cells for given uses • Explain why the test for any ion must be unique • Describe how to carry out the test for ions • Recall the formulae of molecules of the alkanes, methane, ethane, propane and butane, and draw the structures of these molecules, showing all covalent bonds • Describe how other addition polymers can be made by combining together other monomer molecules • Recall the formulae of molecules of alcohols and carboxylic acids • 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	**Reading** • Edexcel combined science text book • Recommended reading texts • CGP revision guide • PLC checklists **Numeracy** • Recall of key values and quantities • Recall, use and application of equations • Conversion between units • Working with numbers in standard form • Drawing appropriate graphs and tables with suitable scales/ headings and plotting/ recording data • Describing mathematical patterns in experimental data and explaining them using scientific concepts • Perform calculations based on extracting data from both tables and graphs **Oracy and Literacy** • Key words • Writing a method for core practicals • Six mark questions	**Formative** • Questioning in lessons • Live student performance in lessons followed by questions • Whole class feedback during lessons • Regular peer and self assessment • Book checks for general presentation, work completion and spellings • Low stakes quizzing • Learning checkpoints in between main assessments **Summative** • 3 cumulative assessments throughout the year

ERASMUS DARWIN ACADEMY

Excellence for All

Assessment Skills, Knowledge and Concepts Map

Key learning questions	Edexcel Chemistry Year 10 Assessment Phase 1 Quantitative analysis
☐ Give one property of transition metals that makes them useful in industrial processes. ☐ Why are pure metals not strong enough for many uses? ☐ Why are alloys harder than pure metals? ☐ Which two substances need to be present for iron to rust? ☐ What is electroplating? ☐ Why isn't Universal indicator a suitable indicator to use in a titration? ☐ Describe how an acid should be added from a burette to an alkali in a flask when a titration is near its end-point ☐ What is the yield of a reaction? ☐ Give the formula used to calculate the percentage yield of a reaction. ☐ Give three reasons why percentage yields are never 100% ☐ What is the atom economy of a reaction? ☐ Give the equation used to find the atom economy of a reaction ☐ Give two reasons why reactions with high atom economies are preferred for use in industry over those with low atom economies ☐ State the formula for calculating molar volume ☐ Give two examples of elements that plants require to grow ☐ What is a fuel cell? ☐ Name the substance produced during the reaction in a hydrogen-oxygen fuel cell	☐ Recall that most metals are transition metals and describe their typical properties ☐ Recall that the oxidation of metals results in corrosion ☐ Explain how rusting of iron can be prevented ☐ Explain how electroplating can be used to improve the appearance and/or the resistance to corrosion of metal objects ☐ Explain, using models, why converting pure metals into alloys often increases the strength of the product ☐ Explain why iron is alloyed with other metals to produce alloy steels ☐ Explain how the uses of metals are related to their properties (and vice versa) for AL, CU, Ag and alloys inc: magnalium and brass ☐ Calculate the concentration of solutions in mol dm–3 and convert concentration in g dm–3 into mol dm–3 and vice versa ☐ Core Practical: Carry out an accurate acid-alkali titration, using burette, pipette and a suitable indicator ☐ Carry out simple calculations using the results of titrations to calculate an unknown concentration/volume of a solution ☐ Calculate the percentage yield of a reaction from the actual yield and the theoretical yield ☐ Describe that the actual yield of a reaction is usually less than the theoretical yield and that the causes of this ☐ Recall the atom economy of a reaction forming a desired product ☐ Calculate the atom economy of a reaction forming a desired product ☐ Explain why a particular reaction pathway is chosen to produce a specified product ☐ Describe what the molar volume, of any gas at room temperature and pressure is ☐ Use the molar volume and balanced equations in calculations involving the masses of solids and volumes of gases ☐ Use Avogadro's law to calculate volumes of gases involved in a gaseous reaction, given the relevant equation ☐ Describe what the Haber process is ☐ Predict how the rate of attainment of equilibrium is affected by: changes in temperature, pressure, concentration and use of a catalyst ☐ Explain how, in industrial reactions, including the Haber process, conditions used are related to cost, energy and acceptable yield ☐ Name the elements (in compound form) fertilisers may contain to promote plant growth ☐ Describe how ammonia reacts with nitric acid to produce a salt that is used as a fertiliser ☐ Describe and compare the laboratory and industrial production of ammonium sulfate ☐ Recall that a chemical cell produces a voltage until what happens ☐ Recall that in a hydrogen–oxygen fuel cell hydrogen and oxygen are used to produce a voltage and name the only product ☐ Evaluate the strengths and weaknesses of fuel cells for given uses
Key learning questions	**Dynamic equilibria and Qualitative analysis: tests for ions**

□ Write the word and balanced symbol equation for the Haber process □ Describe how to do a flame test □ 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 □ Which of the precipitates will redissolve when excess sodium hydroxide is added? □ What gas is produced when hydrochloric acid is added to a solution of carbonate ions? □ Describe how you would test for the gas in the question above □ Describe how to test a solution to see if it contains bromide ions □ Other than identify metal ions, what other information can flame photometry provide? □ Give an advantage of flame photometry over conducting flame tests	□ Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and how the direction of some reversible reactions can be altered □ Explain what is meant by dynamic equilibrium □ Describe the formation of ammonia as a reversible reaction in the Haber process □ Recall the conditions for the Haber process □ Predict how the position of a dynamic equilibrium is affected by changes in temperature, pressure and concentration □ Explain why the test for any ion must be unique □ Describe flame tests to identify the following ions in solids: Li+, Na+, K+, Ca2+, Cu2+ including the colours of the flames □ Describe tests to identify the following ions: Al3+, Ca2+, Cu2+, Fe2+, Fe3+, NH4 using NaOH solution □ Describe the chemical test for ammonia □ Describe tests to identify the following ions: CO32–, SO42–, Cl-, Br-, I- □ Core Practical: Identify the ions in unknown salts, using the tests for the specified cations and anions in the specification □ Identify the ions in unknown salts, using results of the tests stated □ Describe that instrumental methods of analysis are available and that these may improve sensitivity, accuracy and speed of tests □ Evaluate data from a flame photometer to determine the concentration of ions in dilute solution using a calibration curve □ Evaluate data from a flame photometer to identify metal ions by comparing the data with reference data □ To identify metal ions by comparing the data with reference data

Key learning questions	Edexcel Chemistry Year 10 Assessment Phase 2 Hydrocarbons and Polymers
☐ Draw the structure of propane ☐ Explain why alkanes are described as unsaturated ☐ Draw the structure of ethane, showing all covalent bonds ☐ What kind of reaction happens between alkenes and bromine? ☐ What are the products of the complete combustion of hydrocarbons? ☐ What is a polymer? ☐ Name the monomer used to make (poly)ethane ☐ State the properties of PVC and suggest why it is used to make water pipes ☐ What is the minimum number of functional groups a molecule must have to undergo condensation polymerisation? ☐ How many different types of monomers are present in DNA? ☐ What type of monomer are proteins based on? ☐ Name the functional group contained in the monomer from the above question ☐ What is the main starting material used to make plastics? ☐ Give an advantage of disposing of plastics by combustion ☐ Give two ways recycling helps to reduce the impact of polymers on the environment ☐ Give one way in which recycling polymers damages the environment	☐ Recall the formulae of molecules of the alkanes, methane, ethane, propane and butane, and draw the structure of these ☐ Explain why the alkanes are saturated hydrocarbons ☐ Recall the formulae of molecules of the alkenes, ethene, propene, butene, and draw the structures (but-1-ene and but-2-ene only) ☐ Explain why the alkenes are unsaturated hydrocarbons ☐ Recall the addition reaction of ethene with bromine, showing the structures of reactants and products, and extend this to other alkenes ☐ Explain how bromine water is used to distinguish between alkanes and alkenes ☐ Describe how the complete combustion of alkanes and alkenes involves the oxidation of the hydrocarbons, name the products ☐ Recall that a polymer is a substance of high average relative molecular mass made up of small repeating units ☐ Describe how ethene molecules can combine together in a polymerisation reaction ☐ Describe that the addition polymer formed is called polyethene ☐ Describe how other addition polymers can be made by combining together other monomer molecules containing C=C ☐ Describe how to deduce the structure of a monomer from the structure of an addition polymer and vice versa ☐ Explain how the uses of polymers are related to their properties and vice versa ☐ HT - Explain why polyesters are condensation polymers ☐ 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 ☐ HT Explain how a molecule of water is formed each time an ester link is formed ☐ Describe some problems associated with polymers including the availability of starting materials ☐ Describe the advantages and disadvantages of recycling polymers, including economic implications, availability of starting materials and environmental impact ☐ Recall that DNA is a polymer made from four different monomers called nucleotides ☐ Recall that starch is a polymer based on sugars ☐ Recall that proteins are polymers based on amino acids

Key learning questions	**Alcohols and Carboxylic Acids**

□ What is the general formula for alcohols? □ Name the first four alcohols □ What is the chemical formula for propanol? □ Draw the structure of methanol □ Write the word equation for the process of fermentation □ State the role of yeast in fermentation □ Describe and explain the conditions needed for fermentation □ Name the first four carboxylic acids □ Draw the structure of methanoic acid □ Suggest the product of the oxidation of propanol	□ Recall the formulae of molecules of the alcohols, methanol, ethanol, propanol and butanol, and draw the structures of these molecules, showing all covalent bonds □ Recall that the functional group in alcohols is –OH □ Core Practical: Investigate the temperature rise produced in a known mass of water by the combustion of the alcohols ethanol, propanol, butanol and pentanol □ 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 □ Recall that the functional group in carboxylic acids is –COOH □ Recall that ethanol can be oxidised to produce ethanoic acid and extend this to other alcohols □ 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 □ Describe the production of ethanol by fermentation of carbohydrates in aqueous solution, using yeast to provide enzymes □ Explain how to obtain a concentrated solution of ethanol by fractional distillation of the fermentation mixture

Key learning questions	Edexcel Chemistry Year 10 Assessment Phase 3 Bulk and surface properties of matter including nanoparticles
□ What is the size range for nanoparticles in metres? Give your answer in standard form □ Why do nanoparticles often behave differently to the bulk material □ What property of nanoparticles gives them the potential to be used as catalysts □ Give one way nanoparticles could be used in medicine □ What property do some nanoparticles have which means they can be used in electronics? □ Give one advantage of using nanoparticles in sunscreens over traditional ingredients □ Give one possible disadvantage of using nanoparticles in sunscreens □ Why are properties of polymers so varied? □ Why is clay an ideal material for making bricks? □ What is a composite material? □	□Compare the size of nanoparticles with the sizes of atoms and molecules □ 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 □ Explain the possible risks associated with some nanoparticulate materials □ Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals □ 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 □ Explain the possible risks associated with some nanoparticulate materials □ Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals □ Explain why the properties of a material make it suitable for a given use and use data to select materials appropriate for specific uses