West Kirby Grammar School

Curriculum Map – Year 11 – Chemistry (2023-24)

Topic name	Term	Skills developed	Link to NC subject content	Prior knowledge	Next link in curriculum
4.7 Organic Chemistry (part 1)	Autumn	Recognise substances that are alkenes from their names or from given formulae in these forms. Make models of alkane molecules using the molecular modelling kits.	• Fractional distillation of crude oil and cracking to make more useful materials • Simple and fractional distillation • Carbon compounds, both as fuels and feedstock, and the competing demands • Bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings	KS3 Y8 The Earth, Materials & The Environment • Burning fossil fuels GCSE 4.9 Chemistry of the Atmosphere • Combustion of fossil fuels	Links to GCSE topic 7 and A' level, Unit 3 – Organic Chemistry Year 11: • alcohols and carboxylic acids • addition and condensation polymerisation Introduction to organic chemistry Year 12: • Formulas • Functional group • nomenclature • alkanes and petroleum test for functional groups
4.7 Organic Chemistry Part 2	Autumn	WS 1.2 Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. MS 5b - Visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects.	Alkenes • Recall the general formula of alkenes names • Recall the names, structural formula and displayed formula of the first four alkenes • Describe the reactions and conditions for the addition of hydrogen, water and halogens to alkenes • Draw fully displayed structural formulae of the first four members of the alkenes and the products of their addition reactions with	KS3 Y8 The Earth, Materials & The Environment • Burning fossil fuels GCSE 4.9 Chemistry of the Atmosphere • Combustion of fossil fuels	Alkenes – AS Chemistry Alcohols – AS Chemistry Carboxylic acids – A2 Chemistry Amino acids, Proteins & DNA – A2 Chemistry

		AT 2, 5, 6 Opportunities when investigating reactions of alcohols. Opportunities within investigation of the reactions of carboxylic acids.	hydrogen, water, chlorine, bromine and iodine. Alcohols • 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 • Recall the main uses of these alcohols. • Describe the conditions used for fermentation of sugar using yeast. • Recognise alcohols from their names or from given formulae. Carboxylic Acids • Describe what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols • (HT only) explain why carboxylic acids are weak acids in terms of ionisation and pH Polymers • Recognise addition polymers and monomers from diagrams in the forms shown and from the presence of the functional group C=C in the monomers • Draw diagrams to represent the formation of a polymer from a given alkene monomer • Relate the repeating unit to the monomer.		

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			• Explain the basic principles of condensation polymerisation • Name types of monomers in naturally occurring polymers		
4.5 Energy Changes	Spring	AT 5 An opportunity to measure temperature changes when substances react or dissolve in water. AT6 Safe and careful use of liquids. MS1a Recognise and use expressions in decimal form Required practical 4: Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals. AT skills covered by this practical activity: 1, 3, 5 and 6.	• Distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings • Evaluate uses and applications of exothermic and endothermic reactions given appropriate information. • Draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds • Use reaction profiles to identify reactions as exothermic or endothermic • Explain that the activation energy is the energy needed for a reaction to occur. • Energy must be supplied to break bonds in the reactants Energy is released when bonds in the products are formed.	KS3 Y8 Chemical Reactions Endothermic & Exothermic reactions	A' level Energetics - AS Chemistry Kinetics – AS Chemistry Electrode Potentials & Electrochemistry – A Level Chemistry Thermodynamics – A Level Chemistry

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4.6 The rate and extent of Chemical change	Spring	WS 2.6 Make and record observations and measurements using a range of apparatus and methods. MS 1a Recognise and use expressions in decimal form. MS 4a Translate information between graphical and numeric form. MS 4b Drawing and interpreting appropriate graphs from data to determine rate of reaction. MS 4c Plot two variables from experimental or other data MS 4d Determine the slope and intercept of a linear graph. MS 4e Draw and use the slope of a tangent to a curve as a measure of rate of change. WS 1.2 Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	• Factors that influence the rate of reaction: varying temperature or concentration, • Changing the surface area of a solid reactant or by adding a catalyst Reversible Reactions • Recognise that some reactions are reversible • Explain how the direction of reversible reactions can be changed by changing conditions • Know that if a reaction is exothermic in one direction, it is endothermic in the opposite direction and that the same amount of energy it transferred in each case. Dynamic Equilibrium (4.6) • Recognise that when a reversible reaction occurs in apparatus which prevents the escape of reactants and products, equilibrium is reached when the forward and reverse reactions occur at exactly the same rate. • Make qualitative predictions about the effect of changes on systems at equilibrium when given appropriate information. • Interpret appropriate given data to predict the effect of a change in concentration of a reactant or product or temperature and	GCSE 4.3 Quantitative Chemistry • Concentrations • Moles	GCSE 4.5 Energy Changes A Level Links to A' level unit 1 Kinetics Year 12 • Reaction rates • Measuring reaction rates Equilibrium, Le Chatelier's Principle and K_c – AS Chemistry Equilibrium Constant K_p for Homogenous Systems – A2 Chemistry

		WS 3.5 Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions. WS 3.8 Communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions through paper-based and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms.	pressure changes on given reactions at equilibrium.		
4.10 Using resources	Summer	WS 1.4 Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. WS 1.6 Recognise the importance of peer review of results and of communicating results to a range of audiences. MS 1a Recognise and use expressions in decimal form.	Life cycle assessment and recycling to assess environmental impacts Associated with all the stages of a product's life The viability of recycling of certain materials for limited resources Extraction and purification of metals related to the position of carbon in a reactivity series. The Earth's water resources and obtaining potable water. The Haber Process (4.10) • Recall that the Haber process is used to manufacture ammonia,		Group 2 and group 7 Year 12 • Water treatment

		MS 1c Use ratios, fractions and percentages. AT 4 - Prepare an ammonium salt.	which can be used to produce nitrogen-based fertilisers. • Recall a source for the nitrogen and a source for the hydrogen used in the Haber process. • Interpret graphs of reaction conditions versus rate • Apply the principles of dynamic equilibrium in Reversible reactions and dynamic equilibrium (page 59) to the Haber process • Explain the trade-off between rate of production and position of equilibrium • 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. NPK Fertilisers • Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid • Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.		