West Kirby Grammar School

Curriculum Map – Year 11 – Chemistry (2024-25)

Topic name	Term	Skills developed	Link to NC subject content	Prior knowledge	Next link in curriculum
4.3 Quantitative Chemistry	*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. WS 3.4 Representing distributions of results and make estimations of uncertainty. WS 4.1 Use scientific vocabulary, terminology and definitions. WS 4.2 Recognise the importance of scientific quantities and understand how they are determined. WS 4.3 Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. WS 4.4 Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano). WS 4.5 Interconvert units. WS 4.6 Use an appropriate number of significant figures in calculation.	• Understand the use of the multipliers in equations in normal script before a formula and in subscript within a formula. • Calculate the percentage by mass in a compound given the relative formula mass and the relative atomic masses. • Explain any observed changes in mass in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle model. • Represent the distribution of results and make estimations of uncertainty • Use the range of a set of measurements about the mean as a measure of uncertainty. • Understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations, for example that in one mole of carbon (C) the number of atoms is the same as the number of molecules in one mole of carbon dioxide (CO_2). • Use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa. • Calculate the masses of substances shown in a balanced symbol equation • Calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product. • Balance an equation given the masses of reactants and products.	KS3 Y8 Atoms, elements & compounds Y8 Chemical reactions 4.1 Atomic structure & The periodic Table	GCSE: Y10 – 4.4.1 Reactivity of metals - extraction of metals Y10 - 4.4.2 Reactions of acids A-level: Y12 3.1.2 Amount of substance

		MS 1a Recognise and use expressions in decimal form. MS 1b Recognise and use expressions in standard form. MS 1c Use ratios, fractions and percentages. MS 3a Understand and use the symbols: =, <, <<, >, >>, ∝, ~ MS 3b Change the subject of an equation. MS 3c Substitute numerical values into algebraic equations using appropriate units for physical quantities. MS 2a Use an appropriate number of significant figures. AT 1, 2,6 Opportunities within investigation of mass changes using various apparatus.	• Students should be able to change the subject of a mathematical equation. • Explain the effect of a limiting quantity of a reactant on the amount of products it is possible to obtain in terms of amounts in moles or masses in grams. • Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution • Change the subject of a mathematical equation.		
4.9 Chemistry of the atmosphere	Autumn	Ms1c To use ratios, fractions and percentages. WS 1.4 Explain every day and technological applications of science; evaluate associated personal, social, economic and environmental	• evidence for composition and evolution of the Earth's atmosphere since its formation • Evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change • Potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate	KS3 Y8 The Earth and Materials • Burning fossil fuels	Links to A'level, Unit 3- Introduction to organic chemistry Year 12: alkanes as fuel

		implications; and make decisions based on the evaluation of evidence and arguments.	• Common atmospheric pollutants: sulphur dioxide, oxides of nitrogen,particulates and their sources	GCSE 4.8 Chemical analysis Testing for gases	
4.7 Organic Chemistry (part 1)	spring	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
4.5 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:	• 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	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

		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.	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.		
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	• 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)	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

		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. 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.	• 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 pressure changes on given reactions at equilibrium.		Equilibrium Constant K_p for Homogenous Systems – A2 Chemistry

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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. MS 1c Use ratios, fractions and percentages. AT 4 - Prepare an ammonium salt.	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.		Group 2 and group 7 Year 12 • Water treatment