West Kirby Grammar School

Curriculum Map – Year 10 - Chemistry (2022-23)

Topic name	Term	Skills Developed	Link to Subject Content	Prior learning	Next curriculum link
4.4 Chemical changes (Reactivity of metals, reactions of acids and Electrolysis)	Autumn	WS 2.4 – carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. AT 1, 3, 8 Opportunities within titrations including to determine concentrations of strong acids and alkalis. AT 3 This is an opportunity to investigate pH changes when a strong acid neutralises a strong alkali. AT 8 An opportunity to measure the pH of different acids at different concentrations.	(HT only) Determination of the concentration of one of the solutions in mol/dm3 and g/dm3 from the reacting volumes and the known concentration of the other solution. AT skills covered by this practical activity: 1 and 8. 8.2.3 Required practical activity 3 Investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis. Apparatus and techniques In doing this practical students should cover these parts of the apparatus and techniques requirements	KS3 Y8 Introduction to bonding Y8 Chemical reactions 4.2 Structure & Bonding • Ionic bonding	GCSE: Y10 – 4.4.1 Reactivity of metals - extraction of metals Y10 - 4.4.2 Reactions of acids A-level: Y13 - 3.3.9.2 Acylation (RP 10) Y13 - 3.1.14 Electrode Potentials Y13 – 3.1.12 Acids & Bases
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.	• 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	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

		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. 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.	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. • 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 • (HT only) explain how the mass of a solute and the volume of a solution is related to the concentration of the solution • Calculate the percentage yield of a product from the actual yield of a reaction • (HT only) calculate the theoretical mass of a product from a given mass of reactant and the balanced equation for the reaction. • Explain how the concentration of a solution in mol/dm3 is related to the mass of the solute and the volume of the solution. • Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass • Calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product		

4.9 Chemistry of the atmosphere	*Spring*	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 implications; and make decisions based on the evaluation of evidence and arguments.	• 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 • Common atmospheric pollutants: sulphur dioxide, oxides of nitrogen,particulates and their sources	KS3 Y8 The Earth and Materials • Burning fossil fuels GCSE 4.8 Chemical analysis Testing for gases	Links to A'level, Unit 3- Introduction to organic chemistry Year 12: • alkanes as fuel

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 material
			• 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	Summer	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. AT 2, 5, 6 Opportunities when investigating reactions of alcohols. Opportunities within investigation of the reactions of carboxylic acids.	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 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	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

			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. • Explain the basic principles of condensation polymerisation • Name types of monomers in naturally occurring polymers		