West Kirby Grammar School

Curriculum Map – Year 10 - Chemistry (2024-25)

Topic name	Term	Skills Developed	Link to Subject Content	Prior learning	Next curriculum link
4.1 Atomic Structure and the Periodic table	*Autumn*	AT 4 Safe use of a range of equipment to separate chemical mixtures. WS 2.2, 2.3 WS 1.1, 1.6 This historical context provides an opportunity for students to show an understanding of why and describe how scientific methods and theories develop over time. WS 1.2 WS 1.2 WS 4.3, 4 Use SI units and the prefix nano. MS 1b Recognise expressions in standard form. MS 1d WS 1.2 Students should be able to represent the electronic structures of the first twenty elements of the periodic table in both forms. MS 5b Visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects. WS 1.1, 1.6 Explain how testing a prediction can support or refute a new scientific idea. WS 1.2 WS 1.2 WS 1.2 AT 6 Offers an opportunity within displacement reactions of halogens.	• 4.1.1.2 Mixtures • 4.1.1.3 The development of the model of the atom • 4.1.1.4 Relative electrical charges of subatomic particles • 4.1.1.5 Size and mass of atoms • 4.1.1.7 Electronic structure • 4.1.2.2 Development of the periodic table • 4.1.2.4 Group 0 • 4.1.2.5 Group 1 • 4.1.2.6 Group 7	*Links from prior topics:* KS3 Y7 Particles Y8 Atoms, Elements and Compounds Y8 Separating Mixtures	*Links to future topics:* GCSE: Y10 - 4.7 Organic chemistry – crude oil/reactions Y9 - 4.2 Bonding, structure, and the properties of matter – forming ions A-level: Y12 - 3.1.1 Atomic structure – development of the atom, sub atomic particles Y12 - 3.2.1 Periodicity Y12 - 3.2.2 Group 2, the alkaline earth metals Y12 - 3.2.2 Group 2, the alkaline earth metals Y13 - 3.2.5 Transition metals

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4.2 Bonding, Structure and the properties of matter	Autumn	MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. WS 1.2 MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. WS 1.2 MS 4a MS 1a, 1c WS 1.2 Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding. MS 5b WS 1.2 Recognise substances as metallic giant structures from diagrams showing their bonding. MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. WS 1.2 WS 1.2 MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. WS 1.2 WS 1.2 MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.	• 4.2.1.2 Ionic bonding • 4.2.1.3 Ionic compounds • 4.2.1.4 Covalent bonding • 4.2.1.5 Metallic bonding • 4.2.2.1 The three states of matter • 4.2.2.4 Properties of small molecules • 4.2.2.6 Giant covalent structures • 4.2.2.7 Properties of metals and alloys • 4.2.3.1 Diamond • 4.2.3.2 Graphite • 4.2.3.3 Graphene and fullerenes • 4.2.4.1 Sizes of particles and their properties • 4.2.4.2 Uses of nanoparticles	*Links from prior topics:* KS3 Y7 Particles Y8 Atoms, Element & Compounds GCSE 4.1 Atomic structure	*Links to future topics:* GCSE: Y10 – 4.4.3 Electrolysis - conductivity A-level: Y12 - 3.1.3 Bonding

		WS 1.2 WS 1.2, 1.4 MS 5b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. WS 1.2, 1.4, 4.1, 4.2, 4.3 4.4, 4.5 MS 2h Make order of magnitude calculations. MS 5c Calculate areas of triangles and rectangles, surface areas and volumes of cubes. MS 1b Recognise and use expressions in standard form. MS 1c Use ratios, fractions and percentages. MS 1d Make estimates of the results of simple calculations. WS 1.3, 1.4, 1.5			
4.8 Chemical analysis	*Spring*	MS 1a Recognise and use expressions in decimal form. MS 1c Use ratios, fractions and percentages. WS 1.4, 2.2, 4.1 WS 2.2, 3.1, 2, 3 MS 1d Make estimates of the results of simple calculations. MS 2a AT 8 An opportunity to investigate flame colours. AT 8 An opportunity to make precipitates of metal hydroxides.	• Distinguishing between pure and impure substances • separation techniques for mixtures of substances: filtration, crystallisation, • Chromatography • identification of common gases • An opportunity to investigate flame colours • An opportunity to make precipitates of metal hydroxides.	KS3 Y8 Chemical reactions Testing for gases Y8 Introduction to bonding Y8 The Periodic table 4.1 Atomic Structure & The Periodic Table Group 7 Separation of mixtures 4.2 Structure & Bonding Ionic bonding	*Links to future topics:* GCSE 4.4 Chemical Changes A Level Group 2 and group 7 elements • Halide ions • Test for ions Links to GCSE Topic 7 and A' level unit 2 – Organic chemistry Year 11: • Polymers

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4.4 Chemical changes (Reactivity of metals, reactions of acids and Electrolysis)	Spring	AT 2 – safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater. AT 3 – use of appropriate apparatus and techniques for conducting chemical reactions, including appropriate reagents. AT 4 – safe use of a range of equipment to purify and/or separate chemical mixtures including evaporation, filtration, crystallisation. AT 6 – safe use and careful handling of liquids and solids, including careful mixing of reagents under controlled conditions. Key opportunities for skills development. In doing this practical there are key opportunities for students to develop the following skills. AT 7 – use of appropriate apparatus and techniques to draw, set up and use electrochemical cells for separation and production of elements and compounds. AT 8 – use of appropriate qualitative reagents and techniques to analyse and identify unknown samples or products including gas tests for hydrogen, oxygen and chlorine. Key opportunities and skills development WS 2.3 – apply a knowledge of a range of techniques, instruments, apparatus, and	• 4.4.1.2 The reactivity series • Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution • Use the pH scale to identify acidic or alkaline solutions. • Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately • (HT Only) Calculate the chemical quantities in titrations involving concentrations in mol/dm3 and in g/dm3. • 4.4.3.4 Electrolysis of aqueous solutions 8.2.1 Required practical activity 1 Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. Apparatus and techniques In doing this practical students should cover these parts of the apparatus and techniques requirements. Required practical 2: Determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration.	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

		materials to select those appropriate to the experiment. 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		
4.3 Quantitative Chemistry	*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. 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 as the number of molecules in one mole of carbon dioxide (CO_2).	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.	• 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 • Change the subject of a mathematical equation.		

4.9 Chemistry of the atmosphere	*Summer*	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