HGS Curriculum Map Chemistry

Year Group: 12

Overall Intent	Our aim is that all our Science learners at HGS are inspired to develop their understanding of the world around them through the subjects of Biology, Chemistry and Physics. Science has changed our lives for the better. A good understanding of Science is vital to the world's future prosperity and to ensuring that our planet is able to support life for many generations to come. Our vision, is that students develop a sense of excitement and curiosity about natural phenomena and understand how Science can be used to explain what is happening in the world around us and to predict how things will behave. The faculty is committed to developing students' practical, mathematical, analytical skills as well as their understanding of the uses and implications of science today and for the future. Through the study of Science, we want our students to become thoughtful and responsible citizens who are able to make informed decisions about how their choices impact on the world around them.					
Time period	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics/sub-topics	**Teacher 1** Atomic structure Introduction to organic **Teacher 2** Amount of substance	**Teacher 1** Alkanes Haloalkanes Alkenes **Teacher 2** Bonding	**Teacher 1** Alcohols Analytical Techniques Periodicity Redox **Teacher 2** Kinetics Equilibria	**Teacher 1** Group 2 Group 7 NMR spectroscopy **Teacher 2** Energetics	**Teacher 1 & 2** Aspirin project	**Teacher 1** Exam preparation Chromatography **Teacher 2** Exam preparation Stretch practical
Crucial Learning Content (What are the key themes, knowledge, skills, terms, vocabulary	**Teacher 1** Atomic structure and isotopes. The mechanics of TOF mass spectroscopy and analysis of data	**Teacher 1** Fractional distillation, cracking, combustion of alkanes.	**Teacher 1** Ethanol production, nomenclature, distillation, oxidation, aldehydes and	**Teacher 1** Properties of group 2 elements, properties of group 2	**Teacher 1 & 2** The history of aspirin, writing a method for the synthesis of aspirin,	**Teacher 1** Exam technique and review of key topics from Y12.

they need to know and remember from this unit?	from this. The 1st ionisation and successive ionisation of elements. Electron configurations. Carbon compounds, nomenclature, isomerism. **Teacher 2** Relative masses, moles, empirical and molecular formulae, reacting masses, solutions, gases, yield and atom economy, titration.	Free radical substitution, nucleophilic substitution, elimination. E-Z isomerism Electrophilic addition, addition polymerisation. **Teacher 2** Ionic, covalent, giant covalent, metallic, electronegativity, intermolecular forces, hydrogen bonding, changes of state, shapes of molecules, ionic equations.	ketones test, elimination. Infrared spectroscopy, high resolution spectroscopy. Trends across period 2. Oxidation states, half equations **Teacher 2** Effect of concentration, temperature, surface area, catalysts and pressure on rates of chemical reaction. Maxwell-Boltzmann distribution. Dynamic equilibrium, Le Chatelier's principle, K_c.	hydroxide and sulfates. Group 7 elements, displacement reactions and REDOX, uses of halogens. Analysis by ^{1}H and ^{13}C NMR spectroscopy, solvents, reference, spin-spin coupling, integration, chemical shift and shielding, interpretation of spectra. **Teacher 2** Calorimetry, combustion, Hess Law using enthalpy of formation and combustion data, mean bond enthalpies.	synthesising then testing aspirin.	TLC, GC and column chromatography. **Teacher 2** Exam technique and review of key topics from Y12 Stretch practical testing student's ability to plan and carry out a practical independently.
Sequence (Where does this fit – what have they	**Atomic Structure** GCSE	**Alkanes** GCSE Carbon compounds,	**Alcohols** GCSE Alkenes and alcohols	**Group 2** GCSE The periodic table	**Aspirin project** Y12 & Y13	**Exam preparation** Y12 & Y13

done before which supports it, where does it link with future units?)	Atomic structure, identification of ions by chemical and analytic techniques. Y12 Periodicity Y13 Transition Metals	common atmospheric pollutants. Y13 Organic synthesis.	Y13 Aldehydes and ketones, organic synthesis.	Y12 Atomic structure Redox	Linked to many aspects of Y12 & Y13 organic chemistry. Y12 Amount of substance.	Application of knowledge from all aspects of the course.
	Introduction to Organic GCSE Carbon compounds, alkenes and alcohols. Y12 & Y13 All future organic topics.	**Haloalkanes** Y12 Introduction to organic, alkanes, alkenes Y13 Amines Organic synthesis	**Analytical Techniques** GCSE Identification of ions by chemical and analytic techniques. Y12 &Y13 Analysis will support all aspects of organic chemistry covered. NMR spectroscopy	**Group 7** GCSE The periodic table Y12 Atomic structure Redox		**Chromatography** GCSE Atomic structure Formulations and chromatography Y12 Analytical techniques Y13 Amino acids, proteins, DNA.
	Amount of substance GCSE Mass conservation, reacting masses and equations, yield and atom economy, solutions, molar gas volume. Y12 & Y13 Mole calculations will be fundamental in all	**Alkenes** GCSE Alkenes and alcohols. Y12 Introduction to organic, alkanes, haloalkanes. Y13 Polymers	**Periodicity** Y12 Atomic structure Y13 Periodicity	**NMR spectroscopy** Y12 &Y13 Analysis will support all aspects of organic chemistry covered. Analytical techniques		**Stretch practical** Y12 Amount of substance.

	chemistry topics in particular physical chemistry topics.	**Bonding** GCSE Bonding Y12 Alkanes Y13 Optical isomerism Transition metals Amino acids, proteins, DNA.	**Redox** GCSE Electrolysis Reactivity of Metals Y12 Group2, group7.	**Energetics** Endothermic and Exothermic reactions Y13 Thermodynamics		
			Kinetics GCSE Rates of reaction Y13 Kinetics			
Skills Acquired	AT a b d e f k PS 1.2 2.3 3.3 MS 0.1 0.4 1.1 1.2 1.3 3.1 4.1 4.2 4.3	AT a b d g h k PS 1.1 1.2 4.1 MS 0.3 4.1	AT a b d e g k i PS 1.1 1.2 2.2 2.3 2.4 3.1 MS 0.3 1.1 2.2 2.3	AT a b c d k PS 2.2 2.4 3.1 3.2 3.3 4.1 MS 0.0 1.1 1.2 2.2 2.3 2.4 3.3		
End Point (What do we want them to know, do and remember at the end of this unit?)	Structure of the atom and how this has changed with time. Properties of subatomic particles. Electron configurations including s, p, and d sub-levels. The trend in 1st ionisation energies and subsequent ionisations with emerging ability to explain these	Further application of IUPAC nomenclature at for alkanes, haloalkanes and alkenes. Use of alkanes as fuels and environmental issues associated with this. Processing crude oil by fractional distillation and by catalytic and thermal cracking.	Understanding of the different methods of ethanol production via fermentation and from ethene. Products of complete and incomplete oxidation of primary and secondary alcohols. Chemical tests for alcohols, aldehydes and	Understanding of reactions and trends in group 2 and 7 elements. Analysis of NMR spectra to determine the structure of an unknown organic molecule utilising information	Application core practical techniques: reflux, reduced pressure filtration, recrystallisation, titration, colorimetry, TLC, melting point analysis.	Knowledge of the following chromatography techniques, their applications and analysis: GC, TLC, paper chromatography including 3D. Core practical techniques.

	based upon electron configurations. IUPAC nomenclature of branched alkanes, simple alkenes and haloalkanes. Representing molecules with structural formulae, empirical and molecular formulae. Structural isomerism. Amount of substance calculations including reacting mass calculations, determination of empirical formulae, percentage yield, atom economy and amount of substance in gases and solutions. Presenting answers to the correct number of	The mechanism of free radical substitution in the formation of haloalkanes. The environmental issues associated the CFC's and the ozone layer. The mechanism of nucleophilic substitution of haloalkanes with the hydroxide ion, cyanide ion and ammonia. The elimination mechanism from haloalkanes. Nomenclature of primary, secondary and tertiary haloalkanes. Understanding of the bonding within ionic, simple covalent, giant covalent and metallic substances and the properties of these substances.	ketones. Elimination from alcohols. Identification of organic compounds by infrared spectroscopy. The use of high-resolution mass spectroscopy in the identification of molecules with similar M_r. Explanations and discussion on the trends in first ionisation energies, atomic radii, and melting points across period 3. Determination of oxidation states and construction of balanced half equations. Using collision theory and Maxwell-	attained from the chemical shift, integration and spin-spin coupling. The use of simple calorimetry to determine enthalpy changes for neutralisation and combustion reactions. The application of Hess Law. Calculation of enthalpy change using mean bond enthalpy data. Competence with the practical technique calorimetry.		

	significant figures and working with standard form. Competence with the practical techniques, making up volumetric solutions and titration.	Electronegative elements. Intermolecular forces. Determination of shapes of molecules for unknown compounds.	Boltzmann distribution to explain the impact of changing conditions of the rate of reaction. Competence with the practical techniques measuring rates of reactions.			
Assessment: **Formative & summative** How will we know what they have learnt and can remember?	Interim exam and marked tasks. CPAC required practical 1.	CAT exam and marked tasks.	Interim exam and marked tasks. CPAC required practicals 3, 5 & 6.	CAT exam and marked tasks. CPAC required practicals 2 & 4.	Interim exam and marked tasks.	End of year exam and marked tasks.