Curriculum Map

Subject: Chemistry **Year Group: 12**

	Autumn 1/Autumn 2	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	**Bridging Course: Skills and Knowledge from GCSE** **Physical Chemistry 1: Atomic Structure** Fundamental particles mass nos and isotopes, TOF mass spec, electron config **Organic Chemistry 1: Introduction to Organic Chemistry** Nomenclature, reaction mechanisms, isomerism	**Physical Chemistry 1: Amount of Substance** RAM/RFM, the mole, ideal gas eq, EF/MF equations, titration calcs, yield, atom economy **Organic Chemistry 1: Alkanes** Fractional distillation, cracking, combustion, chlorination	**Physical Chemistry 1: Bonding** Ionic/covalent/metallic bonding and properties shapes of molecules/ions bond polarity intermolecular forces **Energetics** Enthalpy change calorimetry, application of Hess's law, bond enthalpies **Organic Chemistry 1: Halogenoalkanes** nucleophilic substitution, elimination, ozone depletion	**Physical Chemistry 1: Kinetics** collision theory maxwell boltzman effect of temp /conc Pressure on rate catalysts **Equilibria** Le Chatelier's Principle Kc **Organic Chemistry 1: Alkenes** Structure, bonding, reactivity, addition reactions, addition polymerisation **Alcohols** Nomenclature, structure, physical properties, Production, oxidation elimination,	**Physical Chemistry 1: Oxidation, Reduction and Redox Reactions** Oxidation States, Half Equations **Organic Chemistry 1: Organic Analysis** Identification of functional groups Infra-Red Spectroscopy Mass Spectrometry	**Inorganic Chemistry 1: Periodicity** Period 3 elements **Group 2** Physical and Chemical Properties **Group 7** Chemical Reactions of Halogens Reactions of Halide Ions Uses of Chlorine
Skills	**ATOMIC STRUCTURE** - Report calculations to an appropriate	**AMOUNT OF SUBSTANCE RAM/RFM -**Report	**BONDING** -Find the type of structure of unknowns by	**KINETICS** --be able to use collision theory to	**ORGANIC ANALYSIS** -Carry out test-tube	**PERIODICITY** Understand and explain the trends

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	number of significant figures, given raw data quoted to varying numbers of significant figures. - Calculate weighted means e.g. calculation of an atomic mass based on supplied isotopic abundances. - Interpret and analyse spectra. - Carry out calculations using numbers in standard and ordinary form e.g. using the Avogadro constant. -Carry out calculations using the Avogadro constant **INTRO TO ORGANIC CHEM.** -Draw further isomers from a given structure of one isomer. -Identify isomers from various representations - Understand the origin of E–Z isomerism. -Draw different forms of isomers	calculations to an appropriate number of significant figures, given raw data quoted to varying numbers of significant figures. - Understand that calculated results can only be reported to the limits of the least accurate measurement. - Carry out calculations using numbers in standard and ordinary form e.g. using the Avogadro constant. -Carry out calculations using the Avogadro constant. -Find the Mr of a volatile liquid. - Understand that the correct units need to be in pV = nRT. -Carry out calculations with the ideal gas equation,	experiment (eg to test solubility, conductivity and ease of melting). - Deduce the shape according to valence shell electron pair repulsion (VSEPR) principle when given familiar and unfamiliar examples of species. - Deflect jets of various liquids from burettes to investigate the presence of different types and relative size of intermolecular forces **ENERGETICS -**describe exo and endo thermic reactions -define enthalpy and carry out simple calorimetry PSA9 -Use q=mcDT to calc enthalpy change -Define Hess's law -be able to use HL to calc DHf and DHc -Use bond enthalpies to calc energy changes **HALOALKANES** -Follow instructions when carrying out test-tubehydrolysis of halogenoalkanes to show their relative rates	describe how T,C,P and SA affect reaction rate define activation energy and draw energy level diagrams which incl Ea -- know how to draw M-B distribution curve and use it to explain effect of T on rate - Know how catalysts work, examples and how to use reaction profiles for catalysed reactions. **CHEMICAL EQUILIBRIA** - Estimate the effect of changing experimental parameters on a measurable value eg how the value of Kc would change with temperature, given different specified conditions. -	reactions in the specification to distinguish alcohols, aldehydes, alkenes and carboxylic acids. -Use precise atomic masses and the precise molecular mass to determine the molecular formula of a compound. -Use data in the Chemistry Data Sheet or Booklet to suggest possible structures for molecules. -Use infrared spectra and the Chemistry Data Sheet or Booklet to identify particular bonds, and therefore functional groups, and also to identify impurities. **REDOX**-Work out the oxidation state of an	in the properties of elements as you move across Period 3 of the Periodic Table Explain why the increase in ionisation energies across a period is not regular Describe how euccessive ionisation energies explain electron arrangements **GROUP 2 ELEMENTS** Test the reactions of Mg–Ba with water and Mg with steam and record their results. -Test the solubility of Group 2 hydroxides by mixing solutions of soluble Group 2 salts with sodium hydroxide and record their results. -Test the solubility of Group 2 sulfates by mixing solutions of

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		including rearranging the ideal gas equation to find unknown quantities. -Find the empirical formula of a metal oxide. - Find the concentration of ethanoic acid in vinegar -Find the mass of calcium carbonate in an indigestion tablet -Find the Mr of MHCO3 -Find the Mr of succinic acid -Find the mass of aspirin in an aspirin tablet - Find the yield for the conversion of magnesium to magnesium oxide -Find the Mr of a hydrated salt (eg magnesium sulfate) by heating to constant mass. - Find the percentage conversion of a Group 2	of reaction. -Prepare a chloroalkane, purifying the product using a separating funnel and distillation. -	Report calculations to an appropriate number of significant figures, given raw data quoted to varying numbers of significant figures. - Understand that calculated results can only be reported to the limits of the least accurate measurement. - Calculate the concentration of a reagent at equilibrium. - Calculate the value of an equilibrium constant Kc - Determine the equilibrium constant, Kc, for the reaction of ethanol with ethanoic acid in the presence of a strong acid catalyst to ethyl ethanoate.	element in a compound or ion from the formula. -Write half-equations identifying the oxidation and reduction processes in redox reactions. - Combine half-equations to give an overall redox equation	soluble Group 2 salts with sulfuric acid and record their results. -Test for sulfate ions using acidified barium chloride and record their results. -Explain the trends in atomic radius and first ionisation energy. -Explain the melting point of the elements in terms of their structure and bonding. -Explain why BaCl2 solution is used to test for sulfate ions and why it is acidified. **THE HALOGENS** - Carry out test-tubereactions of solutions of the halogens (Cl2, Br2, I2) with solutions containing their halide ions (eg KCl, KBr, KI). - Record observations from reactions of NaCl,

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		carbonate to its oxide by heat. -Determine the number of moles of water of crystallisation in a hydrated salt by titration. -Construct and/or balance equations using ratios. -Calculate percentage yields and atom economies of reactions. -Select appropriate titration data (ie identify outliers) in order to calculate mean titres. -Determine uncertainty when two burette readings are used to calculate a titre value. **ALKANES -** Fractional distillation of a crude oil substitute		**ALKENES** -be able to name them -be able to recognise geometric isomerism -use CIP rules to name isomers -be able to recall reactions of alkenes with HHal,hal,c H2SO4 -be able to write these mechanisms EA -Write equations for addition polymerisation and id repeating units. -recall issues wrt disposal and recycling **ALCOHOLS** -be able to name them -be able to classify alcohols and recognise these classifications -know 2 ways to produce ethanol and to carry out fermentation -know and recall mech for dehydration of alcohols -Know		NaBr and NaI with concentrated sulfuric acid. -Carry out tests for halide ions using acidified silver nitrate, including the use of ammonia to distinguish the silver halides formed. -Explain the trend in electronegativity -Explain the trend in the boiling point of the elements in terms of their structure and bonding. -explain why silver nitrate solution is used to identify halide ions, the silver nitrate solution is acidified and ammonia solution is added. -Carry out simple test-tube reactions to identify: cations – Group 2, NH4 + anions – Group 7 (halide ions), OH– , CO3 2– , SO4 2– .

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				the reactants, conditions and products for the oxidation of alcohols -be able to draw distillation and reflux apparatus.		
Key questions	What is the evidence for sub-atomic particles? How can we measure the mass of atoms? How was the more sophisticated model of electron arrangement using ideas about orbitals rather than orbits developed? What are the different ways we can represent carbon compounds? How does the IUPAC naming system work? What different types of isomers are there in organic chemistry?	How can we use the idea of the mole in chemical reactions and calculations to determine amount of substance? How can we determine the yield of a reaction? How can we use balanced equations to describe the efficiency of chemical processes? How do the industrial processes fractional distillation and cracking enable us to get useful	What is the difference between chemical bonds and intermolecular forces? How do they all work? How are these forces responsible for properties of solids, liquids and gases? How do electrons contribute to the shape of molecules and ions? What is enthalpy and how is it related to exothermic and endothermic reactions? How can we measure enthalpy changes? How can we use bond enthalpy to work out theoretical enthalpy changes?	What influences the rate of a chemical reaction? How can we use the Maxwell Boltzmann distribution to show what fraction of molecules have enough energy to react at any given temperature? How do catalysts work? How can we influence a dynamic equilibrium to obtain more product? How are alcohols produced? What are their physical	What are redox reactions? How can they be explained using electron transfers? What are oxidation states and why are they a useful concept in chemistry? How can we use a mass spectrometer to determine the relative molecular mass and the formula of organic compounds? What is Infrared spectroscopy and how can it be used to identify functional groups	What are the properties of the elements in Period 3 of the Periodic Table? How can we explain these properties using concepts developed earlier on in the course about bonding and atoms? What are the properties of Group 2 elements? How can we use ideas about electron arrangements to understand bonding in compounds of group 2 elements? What are the properties of

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		products from crude oil? What are the chemical and physical properties of alkanes?	How are halogenoalkanes made? What are their physical and chemical properties? How have halogenoalkanes damaged the ozone layer, and what has been done to solve the problem?	and chemical properties? How are alkenes produced? What are their physical and chemical properties?	in organic compounds?	group 7 elements? How can we explain trends in their reactivity using electronic structure? How can we apply ideas about oxidation states and redox reactions when investigating the halogens and their compounds?
Assessment	**Transition Test** **Topic Tests**	**Topic Tests** **PPE**	**Topic Tests**	**Topic Tests**	**Topic Tests** **PPE**	**Topic Tests** **End of Year Exam**
Literacy/ Numeracy/ SMSC/ Character	Algebra mathematical computation geometry handling data, CFC's and debating environmental issues, resilience when attempting difficult mathematical questions	Algebra mathematical computation geometry handling data, explaining in detail fractional distillation and cracking, Cfc's and debating environmental issues resilience when attempting difficult amount of substance questions	Algebra mathematical computation geometry handling data explaining environmental issues resilience when attempting difficult amount of substance questions	Algebra mathematical computation geometry handling data explaining and debating environmental issues resilience when attempting difficult amount of substance questions	Algebra mathematical computation geometry handling data, debating environmental issues resilience when attempting difficult amount of substance questions	Algebra mathematical computation geometry handling data explaining trends in periodicity, debating environmental issues resilience when attempting difficult amount of substance questions