## Curriculum Content Map

|  | TERM 1 | TERM 2 | TERM 3 |
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| Unit title \& description | Physical Chemistry | Inorganic Chemistry | Organic Chemistry |
| Knowledge | - Atomic Structure: Fundamental particles, mass number and isotopes, electron configuration <br> - Amount of Substance: relative atomic mass and relative molecular mass, the mole and the Avagadro constant, the ideal gas equation, empirical and molecular formula, balanced equations and associated calculations <br> - Bonding: lonic bonding, covalent and dative bonds, metallic bonding, Bonding and Physical Properties, Shapes of simple molecules and ions, Bond polarity, Forces between molecules <br> - Energetics: Enthalpy Change, Calorimetry, Application of Hess's Law, Bond Enthalpy <br> - Kinetics: Collision Theory, MaxwellBoltzman distribution, Effect of temperature, concentration and pressure on reaction rate, catalysts. <br> - Chemical Equilibria, Le Chatelier's Principle, Equilibrium constant, Kc, for homogeneous systems. <br> - Oxidation, Reduction and redox equations | - Periodicity: Classification, physical properties of the period 3 elements <br> - Group 2, the alkaline earth metals: Trends in atomic radius and first ionisation energy, melting points of the elements in terms of their structure and bonding, reactions with water, solubility of hydroxides and sulfates, commercial uses of group 2 compounds <br> - Group 7, the halogens: trends in properties, uses of chlorine and chlorate | - Introduction to organic chemistry: nomenclature, reaction mechanisms and isomerism <br> - Alkanes: Fractional distillation, cracking, combustion and chlorination <br> - Halogenoalkanes: nucleophilic substitution, elimination, ozone depletion <br> - Alkenes: Structure bonding and reactivity, addition reactions, addition polymers <br> - Alcohols: Production, oxidation and elimination reactions <br> - Organic Analysis: identification of functional groups by test-tube reactions, mass spectrometry and infrared spectroscopy. |


| Skills | - Drawing models and using them to predict physical and chemical properties <br> - Determining the electronic configuration of an atom/ion <br> - Calculating a variety of quantitative values. <br> - Predicting properties of compounds using the type of bonding. <br> - Making up a volumetric solution of a known concentration <br> - Carrying out a simple acid-base titration to determine an unknown concentration <br> - Measuring the enthalpy change of a reaction using calorimetry <br> - Using Hess' cycles to determine the enthalpy change of reactions <br> - Measure the rate of reaction experimentally <br> - Interpret a Maxwell-Boltzman distribution and draw curves at higher or lower temperatures <br> - Use concentrations at equilibrium to determine Kc <br> - Predict the position of equilibrium using Le Chatelier's principle <br> - Determine the oxidation state of a range of atoms in different compounds. <br> - Using apparatus correctly <br> - Following a method in order to collect a set of results <br> - Drawing a table identifying independent and dependent variables and units | - Identifying and explaining trends in physical and chemical properties across a period e.g. atomic radius and down the group e.g. solubility <br> - Core practical 4: (assessed by the CPAC criteria) allow students to develop independent working techniques and build confidence in working independently and not needing to double check with the teacher that they are doing it correctly <br> - Presentation of data in appropriate formats <br> - Use of laboratory equipment correctly |
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- Learning how to name organic compounds according to the IUPAC criteria
- Drawing organic molecules in different formats
- Drawing reaction mechanisms using curly arrows to show the movement of electrons
- Be able to explain stereoisomerism with the respect to E-Z isomerism about a double bond
- Be able to explain and apply the Cahn-Ingold-Prelog rules
- Core Practical 5: Use of distillation equipment
- Core Practical 6: Use of chemical tests to distinguish between different organic functional groups
- Interpretation of mass spec data
- Interpretation of infra-red data

| Literacy | - Using scientific vocabulary <br> - Defining scientific key words <br> - Extended writing: Explaining scientific concepts <br> - Describing and evaluating practical methods | - Using scientific vocabulary <br> - Defining scientific key words <br> - Extended writing: Explaining scientific concepts <br> - Describing and evaluating practical methods | - Using scientific vocabulary <br> - Defining scientific key words <br> - Extended writing: Explaining scientific concepts <br> - Describing and evaluating practical methods |
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| $\begin{array}{ll}\text { Numeracy } & \\ & \mathbf{x}-\div \\ & \boldsymbol{-} \boldsymbol{+}\end{array}$ | - Calculating RAM, RMM, Moles, concentration, volume, empirical formula, general formula, enthalpy change, rates, Kc and oxidation states. <br> - Using a range of equations to determine values, rearranging equations and calculating units. | - Write and balance equations for the reaction of chlorine with water and cold, dilute NaOH | - Use angles and shapes in regular 2D and 3D structures: predict the shape of organic molecules including E-Z isomers <br> - Visualise and represent 2D and 3D forms including two-dimensional representation of 3D objects: Draw different forms of an isomer <br> - Understand the symmetry of 2 D and 3D shapes: Determine the number of isomers of a given molecular formula <br> - Use of precise atomic masses and precise molecular masses to determine the molecular formula of a compound |
| Differentiation for MA and LA | - Individual feedback provided for stude <br> - Individual DIRT tasks using GAP analysi <br> - Revision guides and knowledge organis <br> - MA students can attempt the scenario <br> - Set homework which is varied in difficu | when tasks are marked. <br> for LA students stions in the text book to apply their knowle so all students can be challenged. | unfamiliar situations |
| Enrichment learning | - Working as a team to conduct a practical <br> - Project based work involving the research of a hypothesis, constructing a method and carrying it out. | - Required practical: Test tube reactions to identify ions - working independently to carry out the tests, make and record observations and interpret data. <br> - Learning about the industrial and medical uses of group 2 metal compounds e.g. water treatment, barium meals, neutralising flue gas | - Considering the environmental impact of burning alkanes as fuels and how to reduce this using catalytic convertors and flue scrubbers <br> - Evaluating the economic reasons for cracking alkanes <br> - Explaining and evaluating the impact of CFC's on the depletion of the ozone layer <br> - Evaluate whether production of ethanol by fermentation is carbon neutral. |



