



## Curriculum Map

Subject: Chemistry

Year Group: 13

	Autumn 1/Autumn 2	Autumn 2	Autumn 2/Spring 1	Spring 2	Summer 1
<b>Content</b>	<p>ISOMERISM OPTICAL Concept of chirality, polarimeter and racemates</p> <p>ALDEHYDES AND KETONES naming them nuc addition reactions- HCN distinguishing aldehydes and ketones- tollens and fehling's tests oxidation of carbonyls reduction of carbonyls</p> <p>THERMODYNAMICS born - haber cycle Gibbs free energy</p> <p>RATE EQUATIONS rate expression and orders the rate equation rate determine ng step</p> <p>EQUILIBRIUM CONSTANT K<sub>p</sub> K<sub>p</sub>, describing equilibrium constant in terms of partial pressures</p>	<p>CARBOXYLIC ACIDS AND DERIVATIVES naming ester formation and hydrolysis uses of esters-biodiesel acylation reactionsacyllchlorides and acid anhydrides reacting with nucleophiles(amines, ammonia hydroxide water)</p> <p>ELECTROCHEMISTRY the electrochemical series Predicting the direction of redox reactions Electrochemical Cells</p> <p>ACIDS, BASES, BUFFERS Defining an acid pH scale Weak acids and bases Choosing indicators for titrations Buffer solutions</p>	<p>AROMATIC structure and stability of benzene ring electrophilic substitution reactions- nitration and acylation</p> <p>AMINES preparation- red of nitriles phenyl amine amides.</p> <p>POLYMERS condensation polyamides/esters repeating units mpts related to IMF</p> <p>AMINO ACIDS, PROTEINS AND DNA zwitter ions formation of polypeptides enzymes structure of DNA action of anti-cancer drugs</p> <p>INORGANIC CHEMISTRY PERIODICITY Reactions of Period 3 elements Oxides of elements in period 3</p>	<p>ORGANIC SYNTHESIS using prior reactions to create synthetic routes</p> <p>NMR Carbon 13 and H NMR interpretation of spectra</p> <p>CHROMATOGRAPHY TLC/column /gas calculating R<sub>f</sub> values</p> <p>TRANSITION METALS General properties, complex formation, shape of complex ions. Coloured ions, variable oxidation states. Catalysts.</p> <p>REACTIONS OF IONS IN AQ SOLUTIONS Reactions of aq ions with alkali, carbonate and ammonia- - ligand substitution reactions</p>	<p>Revision in preparation for public exams</p>

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			Acid/base nature of period 3 oxides		
<b>Skills</b>	<p><b>OPTICAL ISOMERISM</b> - To recognise the presence of a chiral centre in a given structure in 2D or 3D forms. -To draw the 3D representation of chiral centres in various species.</p> <p><b>ALDEHYDES AND KETONES</b> -carry out test tube reactions to distinguish aldehydes and ketones</p> <p><b>THERMODYNAMICS</b> -be able to perform calculations of an enthalpy change using these BornHaber cycles. - Rearrange the equation <math>\Delta G = \Delta H - T\Delta S</math> to find unknown values. - Determine <math>\Delta S</math> and <math>\Delta H</math> from a graph of <math>\Delta G</math> versus T. -Calculate entropy changes from absolute entropy value - Use the relationship <math>\Delta G = \Delta H - T\Delta S</math> to determine how <math>\Delta G</math> varies with temperature. -Use the relationship <math>\Delta G = \Delta H - T\Delta S</math> to determine the temperature at which a</p>	<p><b>CARBOXYLIC ACIDS AND DERIVATIVES</b> practical to observe reactions of ethanoyl chloride with variety of nucleophiles</p> <p><b>ELECTROCHEMISTRY</b> - know what a half cell is and connect these together to create voltage</p> <p><b>ACID -BASE EQUILIBRIA</b> -understand and use log10 in pH calcs -do students know how to -Carry out pH CALCS for strong acids - calculate conc to pH and vice versa -state pH to 2 dp - understand standard form as applied to Kw -Calc Ph of strong base Calc pH of WA by measuring pH at half neutralisation -plot pH curves -prepare and test a buffer soln</p>	<p><b>AROMATIC</b> -use thermodynamic data to describe stability of benzene delocalised ring structure over kekulé structure - describe the mechanism of electrophilic addition</p> <p><b>AMINES</b> describe the mechanism and reactions of amines as nucleophiles</p> <p><b>POLYMERS</b> -be able to devise repeating units -be able to recognise polyesters/amides - observe demo of nylon being made - be able to explain mpt wrt IMF between polymers</p> <p><b>AMINO ACIDS PROTEINS AND DNA</b> - be able to determine structures in different pH solns - determine repeat unit for polypeptides - know the structure of DNA - know how to join</p>	<p><b>ORGANIC SYNTHESIS</b> - know the reactants and conditions for organic reactions and put them together to make common synthetic routes</p> <p><b>NMR</b> -to know how to interpret <math>^{13}\text{C}</math> and <math>^1\text{H}</math> NMR spectra using data sheet info - understand splitting patterns for <math>^1\text{H}</math> spectra</p> <p><b>CHROMATOGRAPHY</b> - Use thin-layer chromatography to identify analgesics. - Calculate <math>R_f</math> values from a chromatogram. - Compare retention times and <math>R_f</math> values with standards to identify different substances</p> <p><b>TRANSITION METALS</b> - carry out test tube reactions of complexes with variety of ligands to</p>	Exam technique practise using past paper questions

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	<p>reaction becomes feasible.</p> <p><b>RATE EQUATIONS</b> -know how to devise a rate expression -know how to calculate order of reaction from initial rate data -know how to determine rate const - know how to interpret graphs showing orders of reaction -know how to understand the mech of a reaction given rate data</p> <p><b>Kp EQUILIB CONST</b> -be able to calc Kp from partial pressures -be able to calc partial pressures</p>		<p>base pairs with the rest of DNA molecule</p> <p><b>PERIOD 3 AND THEIR OXIDES</b> -to recall the trends in acid base nature of the oxides - to carry out experiments to support learning to understand amphoteric nature of Al oxide</p>	<p>compare substitution rates -Carry out test tube reactions of metal aqa ions with ammonia or conc hydrochloric. - understand and draw shapes of complex ions -understand the origin of cis trans isomerism in sq planar complexes -draw cis trans complexes - perform colorimetry to determine conc of coloured ion and collect data for graph. -reduce Vanadate ion using zinc -perform redox titrations incl mass of iron ii in an iron tablet -perform autocatalysis reactions</p> <p><b>REACTIONS OF IONS IN AQ SOLUTIONS</b> - define lewis acids and base -be able to write equations that represent ligand substitution reactions -carry out relevant test tube reactions</p>	

	<b>Autumn 1/Autumn 2</b>	<b>Autumn 2</b>	<b>Autumn 2/Spring 1</b>	<b>Spring 2</b>	<b>Summer 1</b>
<b>Key questions</b>	<p>What is optical isomerism?</p> <p>What is a carbonyl group? How can we distinguish between different carbonyl compounds?</p> <p>How are aldehydes and ketones made? What chemical reactions do they do? What uses do they have?</p> <p>How can we calculate enthalpy changes that are hard to measure directly?</p> <p>What is entropy and how is it a useful concept?</p> <p>What is the rate equation? What is the order of a reaction?</p> <p>How can reaction mechanisms be linked to ideas about reaction rate?</p> <p>How can we apply the equilibrium law and Le Chatelier's principle to gaseous reversible reactions?</p>	<p>What are the chemical and physical properties of carboxylic acids and their derivatives? How are they made?</p> <p>What are half cells in electrochemistry?</p> <p>How can we predict the course of redox reactions and describe how batteries work?</p> <p>What is an acid?</p> <p>What is the difference between a strong acid and a weak acid? What is a buffer solution?</p>	<p>What are aromatic compounds? What makes a benzene ring so stable? What gives arenes their unexpected properties?</p> <p>How can we explain the reactions of amines using the fact that they have a lone pair of electrons?</p> <p>How are proteins made from amino acids? How does DNA contain the blueprint for living things?</p> <p>How are polymers made? What are the different types of polymers? What environmental issues do polymers present?</p>	<p>What is NMR and why is it useful?</p> <p>What is chromatography and why is it useful?</p> <p>Why do the transition metals have unique chemical properties?</p> <p>Why do they have multiple oxidation states? Why do they form coloured compounds?</p> <p>What happens to metal ions in solution? How do they react?</p> <p>What are ligand substitution reactions?</p>	
<b>Assessment</b>	Topic Tests	Topic Tests PPE	Topic Tests	Topic Tests PPE	Topic Tests
<b>Literacy/ Numeracy/ SMSC/ Character</b>	Kerboodle Retrieval Questions Essay Practice Questions Exampro Past Exam Questions Seneca Learning Assessments				