

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	<u>Thermodynamics</u>	<u>Aromatic Chemistry</u>	<u>NMR and Chromatography</u>	<u>Amino Acids</u>	<u>Revision</u>	
Knowledge	<p>Please see Y12 Curriculum Map</p> <p><u>Carboxylic Acids</u></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Carboxylic Acids</li> <li>- Esters</li> <li>- Acyls</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Naming Esters and Carboxylic Acids</li> <li>- Know some common uses of Esters</li> <li>- Different ways to hydrolyse esters</li> <li>- Name some common acyls</li> <li>- Recall the mechanism for acylation</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Preparation of Aspirin</li> <li>- Preparation of an ester</li> </ul> <p><u>Kinetics</u></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Measuring the rate of a reaction</li> </ul>	<p>Content:</p> <ul style="list-style-type: none"> <li>- Benzene</li> <li>- Aromatic Compounds</li> <li>- Common reactions of Benzene</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Describe the bonding in Benzene</li> <li>- Name some common aromatic compounds</li> <li>- Understand why benzene is more stable than cyclohexa-1,3,5-triene</li> <li>- Draw the mechanism for electrophilic substitution</li> <li>- Draw the mechanism for Friedel's craft acylation</li> </ul> <p><u>Amines</u></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Properties of Amines</li> <li>- Making Amines</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to name</li> </ul>	<p>Content:</p> <ul style="list-style-type: none"> <li>- Hydrogen NMR (Nuclear Magnetic Resonance)</li> <li>- Carbon NMR</li> <li>- TLC (Thin Layer Chromatography)</li> <li>- GC (Gas Chromatography)</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to use NMR to identify the structure of a molecule</li> <li>- Be able to set up a TLC practical</li> <li>- Calculate R<sub>f</sub> of a mixture</li> <li>- Compare retention times of unknown chemicals with known retention times to identify molecules</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Carry out TLC</li> </ul> <p><u>Electrochemical Cells</u></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Half Cells</li> <li>- Calculating E<sub>cell</sub></li> <li>- Describing test tube reactions</li> </ul>	<p>Content:</p> <ul style="list-style-type: none"> <li>- Peptides</li> <li>- Proteins</li> <li>- Enzymes</li> <li>- DNA</li> <li>- Anti-Cancer drugs</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to draw amino acids</li> <li>- Be able to separate mixtures of amino acids</li> <li>- Know how to locate amino acids</li> <li>- Be able to draw peptides</li> <li>- Know primary, secondary and tertiary structure of proteins</li> <li>- Understand the action of enzymes</li> <li>- Understand the structure of DNA</li> <li>- Explain how Cis-Platin works</li> </ul> <p><u>Transition Metals</u></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- General</li> </ul>	<p>- To focus on recapping key knowledge and re-address common misconceptions</p> <p>- Embed additional exam practice for each chapter</p> <p>- Focus on key aspects of required practicals</p>	

	<ul style="list-style-type: none"> <li>- Rate equation</li> <li>- Rate constant</li> <li>- Order of reactions</li> <li>- Rate determining step</li> <li>- Factors affecting the rate of reactions</li> <li>- Arrhenius Equation</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Know the meaning of rate of reaction</li> <li>- Deduce the rate of reaction from a concentration time graph</li> <li>- Derivative the rate equation from a chemical reaction</li> <li>- Perform rate equation calculations</li> <li>- Identify the rate limiting step of a mechanism</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Measuring the initial rate of a reaction</li> <li>- Measuring continuous rates of a reaction</li> </ul>	<ul style="list-style-type: none"> <li>amines</li> <li>- Describe the uses of quaternary ammonium salts</li> <li>- Describe the differences in strengths between different amines</li> <li>- Draw the mechanism of nucleophilic substitution</li> <li>- Draw the mechanism for nucleophilic addition-elimination</li> </ul> <p><b>Equilibrium</b></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Partial Pressures</li> <li>- Equilibrium constant <math>K_p</math></li> <li>- Factors affecting equilibrium</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- To know Dalton's law of partial pressure</li> <li>- Be able to calculate the mole fraction</li> <li>- Be able to calculate units for <math>K_p</math></li> <li>- Describe how changing the conditions of a reaction change the position of equilibrium</li> </ul> <p><b>Acids and Bases</b></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Acids and Bases</li> <li>- pH calculations</li> </ul>	<ul style="list-style-type: none"> <li>- Lithium Ion cell</li> <li>- Fuel Cells</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Set up a simple cell</li> <li>- Draw a simple cell</li> <li>- Describe electrode potential</li> <li>- Calculating <math>E_{cell}</math></li> <li>- Writing RedOx equations</li> <li>- Describe the purpose of fuel cells</li> <li>- Be able to write half equations for fuel cells</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Electrochemical cells</li> </ul>	<ul style="list-style-type: none"> <li>properties</li> <li>- Complexes of transition metals</li> <li>- Ligand exchange reactions</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to write electronic configuration for any transition metal</li> <li>- Draw the 3D configuration of transition metal complexes</li> <li>- Appreciate how the colour of the transition metal compound can be affected by multiple factors</li> <li>- Know the uses of transition metals as catalysts</li> </ul> <p><b>Polymers</b></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Formation of Polymers</li> <li>- Disposal of polymers</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to draw polymers</li> <li>- Disposal of polymers</li> </ul> <p>Content:</p> <ul style="list-style-type: none"> <li>- Know how to carry out condensation polymers</li> <li>- Be able to recognize some</li> </ul>		
--	--	---	---	---	--	--

		<ul style="list-style-type: none"> <li>- Ka Calculations</li> <li>- Ionic Product of Water</li> <li>- Buffer Solutions</li> <li>- Titration Curves</li> <li>- Back Titrations</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Define acids and bases</li> <li>- Calculate the pH of acids</li> <li>- Explain what a weak acid is</li> <li>- Carry out calculations for weak acids</li> <li>- Be able to use Kw to calculate pH of strong bases</li> <li>- State what a buffer solution is</li> <li>- Explain how buffer solutions maintain their pH</li> <li>- Carry out buffer solution calculations</li> <li>- Draw titration curves for different reactions</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Strong and Weak Acids and Bases</li> </ul>		<p>common polymers</p> <ul style="list-style-type: none"> <li>- Be able to draw repeating units</li> <li>- Know the different ways to dispose of polymers</li> </ul> <p><b><u>Inorganic Compounds</u></b></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Metal Aqua Ions</li> <li>- Ligand Substitution</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Explain the behaviour of aluminium hydroxide</li> <li>- Explain what happens in ligand substitution</li> </ul> <p><b>Required Practical:</b></p> <ul style="list-style-type: none"> <li>- Identifying Transition Metals</li> </ul> <p><b><u>Organic Synthesis</u></b></p> <p>Content:</p> <ul style="list-style-type: none"> <li>- Formation of molecules</li> </ul> <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Be able to use the reactions in the specification to devise a synthesis with up to four steps for an organic compound</li> </ul>	
--	--	---	--	--	--

Skills	<ul style="list-style-type: none"> <li>Identifying functional groups</li> <li>Measuring the boiling point of an ester</li> <li>Writing balanced equations for the formation of biodiesel from triglycerides</li> <li>Successfully measure the rate of a reaction</li> <li>Following a given method and adapting it for the experiment</li> <li>Writing a risk assessment</li> <li>Carry out a reflux experiment</li> </ul>	<ul style="list-style-type: none"> <li>Be able to use thermochemical evidence to explain the extra stability of the benzene ring</li> <li>Recognize the structures of amines</li> <li>Predict the qualitative effects of change in temperature on the position of equilibrium and <math>K_p</math></li> <li>Understand and sketch the typical shapes of pH curves</li> <li>Be able to carry out a titration</li> </ul>	<ul style="list-style-type: none"> <li>Be able to use infrared spectroscopy data, mass spectroscopy data and NMR to identify an organic molecule</li> <li>Be able to carry out TLC</li> <li>Evaluate the uses of fuel cells in industry</li> <li>Be able to carry out an electrochemical cell practical</li> </ul>	<ul style="list-style-type: none"> <li>Appreciating the links with biology</li> <li>Be able to identify the monomers of unknown polymers</li> <li>Evaluate the uses and disposal of polymers</li> <li>Use the reactions in the specification to form an unknown molecule</li> <li>Be able to identify transition metals from chemical tests</li> </ul>	<ul style="list-style-type: none"> <li>Recalling important information</li> <li>Exam Technique</li> <li>Spacing</li> <li>Interleaving</li> <li>Elaboration</li> <li>Time management</li> </ul>	
Key Questions	<p>Why do reactions happen?</p> <p>Why are some compounds more stable than others?</p> <p>How can we increase the speed of a chemical reaction?</p>	<p>How do we make aspirin?</p> <p>How do we make sure that many industrial processes are carried out safely?</p> <p>Why is it important that we do not confuse acids and bases in industry and the home?</p>	<p>How do we deduce the structure of an unknown compound?</p> <p>How do we power our portable devices such as laptops and mobile phones?</p>	<p>How is DNA formed?</p> <p>How do some chemotherapy drugs work?</p>		
Assessment	<p>UCAS Retake Exam</p> <p>End of Topic Assessments</p> <p>CPAC's for practicals</p>	<p>End of Topic Assessments</p> <p>CPAC's for practicals</p>	<p>Year 13 Mocks</p> <p>End of Topic Assessments</p> <p>CPAC's for practicals</p>	<p>End of Topic Assessments</p> <p>CPAC's for practicals</p>	<p>Year 13 A-Level Exams</p>	
Literacy/numeracy/SM SC/Charact	<p><b>Numeracy:</b></p> <ul style="list-style-type: none"> <li>- Calculations present in Thermodynamics Chapter</li> <li>- Reading a scale</li> </ul>	<p><b>Numeracy:</b></p> <ul style="list-style-type: none"> <li>- Calculations of equilibrium constants</li> <li>- Calculation of partial</li> </ul>	<p><b>Numeracy:</b></p> <ul style="list-style-type: none"> <li>- Calculate <math>R_f</math> value</li> <li>- Calculating <math>E_{cell}</math></li> <li>- Balancing RedOx equations</li> </ul>	<p><b>Numeracy:</b></p> <ul style="list-style-type: none"> <li>- Be able to balance complex chemical equations</li> </ul>		

er	<ul style="list-style-type: none"> <li>- Constructing a results table</li> <li>- Data analysis</li> <li>- Construction of a tangent</li> <li>- Calculations of rate</li> </ul> <p><b>Keywords:</b> continuous, monitoring, rate constant, initial rate, tangent, order, rate-determining step, arrhenius</p> <p><b>SMSC:</b></p> <ul style="list-style-type: none"> <li>- Students working together to successfully carry out a practical</li> <li>- Students able to identify risks and work safely</li> </ul>	<p>pressures</p> <ul style="list-style-type: none"> <li>- Calculation of mole fractions</li> <li>- Use of appropriate significant figures</li> <li>- Calculation of pH of acids</li> <li>- Calculation of pH of bases</li> <li>- Carry out buffer calculations</li> <li>- Carry out titration calculations</li> </ul> <p><b>Keywords:</b> partial pressure, mole fraction, equilibrium constant, dissociation, ionic product, pH scale, monoprotic acid, base, diprotic acid, pH curve, indicators, buffer, amines, benzene</p> <p><b>SMSC:</b></p> <ul style="list-style-type: none"> <li>- Appreciate nitration of benzene is an important step in the manufacture of explosives</li> <li>- Appreciate the use of amines in dyes</li> <li>- Work together to carry out a practical</li> <li>- Be able to identify risks and work safely</li> </ul>	<ul style="list-style-type: none"> <li>- Reading scales</li> <li>- Recording data in tables</li> <li>- Data analysis</li> </ul> <p><b>Keywords:</b> RedOx, half-cell, salt bridge, electrode potential, electrochemical series, fuel cell, multiplets, splitting patterns, mobile, stationary, chromatography, Rf</p> <p><b>SMSC:</b></p> <ul style="list-style-type: none"> <li>- Appreciate that electrochemical cells can be used as a commercial source of electrical energy</li> <li>- Appreciate the benefits and risks to society associated with the use of these cells</li> <li>- Work together to carry out a practical</li> <li>- Be able to identify risks and work safely</li> </ul>	<ul style="list-style-type: none"> <li>- Be able to calculate the energy required to excite an electron</li> </ul> <p><b>Keywords:</b> Peptides, Proteins, Enzymes,</p> <p>SMSC</p> <ul style="list-style-type: none"> <li>- Cross curriculum links with Biology.</li> <li>- Students understand how we form new drugs to target specific illnesses</li> <li>- Appreciate that computers can be used to help design such drugs</li> <li>- Appreciate that society needs to assess the balance between the benefits and the adverse effects of drugs</li> </ul>		
Enrichment opportunities and futures	<p>Visiting UCL for Science Lectures          Summer Fayre at Royal Institute of Chemistry          Royal Institution Videos          Anaesthesia Heritage Centre          Wellcome collection</p>					