	Year 13 Chemistry					
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
BIG Q Content *(max 5)* Please log into Seneca to support your child to understand this learning	***Why do chemical reactions occur and how does understanding the polarity of and structure of the carbonyl group C=O dictate the physical properties reactions, and synthetic interconversion of aldehydes, ketones, carboxylic acids, and their derivatives?*** Explain why reactions occur in terms of enthalpy and entropy. Describe aldehydes and ketones. Describe the reactions (including mechanisms) of aldehydes and ketones. Describe carboxylic acids and esters. Describe the reactions (including mechanisms) of carboxylic acids and esters.	***How does understanding rate equations and the equilibrium constant (Kp) allow scientists to manipulate parameters to optimise reaction rate and yield?*** ***How does understanding the structure and the reactions of benzene help chemists design a vast array of everyday materials?*** Derive rate equations. Describe how the order of a reaction with respect to a reagent is found experimentally. Describe the connection between the rate equation for a reaction and the reaction mechanism . Predict the effect of changing pressure and temperature on a gaseous equilibrium. Explain the stability of benzene and describe the reactions of aromatic compounds (including mechanisms).	***How does a knowledge of redox reactions and electrode potentials support chemists in developing electrochemical cells for use in commercial applications?*** ***How does understanding acids and bases help explain how pH is maintained by buffers, for example in our blood?*** Describe how electrode potentials are measured. Predict the direction of redox reactions using electrode potentials. Describe the commercial applications of electrochemical cells. Calculate pH for strong and weak acids, strong bases and mixtures. Explain buffer action. .	***How does the oxidation state, charge density, and ligand environment of a transition metal ion dictate its acidic properties, physical geometry, and visible colour in aqueous solution?*** Describe the general properties of transition metals. Determine the shape of transition metal ion complexes. Explain the origin of the colour of a transition metal complex ion. Explain how transition metals and their compounds can act as heterogeneous and homogeneous catalysts. Describe the reactions of ions in aqueous solution.	***How does understanding different functional groups and the way these molecules interact, help chemists develop synthetic pathways to create targeted organic molecules?*** Describe the preparation of and reactions of amines. Describe the structure and bonding in amino acids, proteins and DNA. Describe the way amino acids, proteins and DNA interact. Devise a synthesis, with up to four steps, for an organic compound. Analyse ^{13}C and ^{1}H NMR spectra.	***Recall key concepts.*** ***Apply understanding to exam questions.***
Vocabulary *(max 10)* Please use your child's knowledge notes to help them learn these definitions	Biodiesel. Bond enthalpy. Born-Haber cycle. Covalent Character. Enantiomers. Entropy. Feasible. Gibbs free energy. Nucleophilic addition-elimination. Recrystallisation.	Benzene. Equilibrium constant (K_p). Friedel-Crafts acylation. Homogeneous system. Mole fraction. Partial pressure. Order (of reaction). Rate constant. Rate determining step. Rate equation.	Acid dissociation constant (K_a) Brønsted-Lowry acid. Brønsted-Lowry base. Buffer. Electrochemical cell. Electrochemical series. Electrode potential. Equivalence point. Ionic product of water (K_w) Salt bridge.	Cisplatin. Colorimeter. Co-ordinate bond. Co-ordination number. Heterogeneous catalyst. Homogeneous catalyst. Ligand. Monodentate. Multidentate. Optical isomerism.	Atom economy. Chemical Shift. Coupling. DNA. Enzyme. Nucleophilic addition-elimination. Nucleotide. Peptide link. Protein. Zwitterion	

Catholic Link	Rights and Responsibilities: Human rights act as the boundary conditions that contain chaos within a society.	Care for God's Creation: This is perfectly illustrated by global environmental equilibria, such as the carbon cycle or ocean acidification.	Life and Dignity of the Human Person: Mining lithium and cobalt for batteries often involves dangerous working conditions. Safe chemical engineering practices protect the inherent dignity of workers.	Rights and Responsibilities: Tech companies have a responsibility to source materials ethically, while consumers have a right to clean environments.	Option for the Poor and Vulnerable: Developing low-cost synthetic routes for tropical disease treatments (e.g., malaria) ensures the poor are not left behind.	
Careers Link	Medicinal Chemist, Industrial Chemist	Industrial Chemist, Electrochemist	Electrochemist, Industrial Chemist	Medicinal Chemist, Industrial Chemist	Industrial Chemist, Electrochemist	

Ways to enrich the Y13 Chemistry curriculum at home:

- Complete the online aspirin synthesis practical provided by the RSC: https://virtual.edu.rsc.org/aspirin/experiment/1
- Explore shapes of complex ions here: https://undergrad-ed.chemistry.ohio-state.edu/jmol-viewer/
- Simulate pH curves using the online simulator: https://terpconnect.umd.edu/~toh/models/TitrationDemo.html
- Watch this simple animation showing the structure of DNA: http://www.youtube.com/watch?v=qy8dk5iS1f0
- There are some excellent chemistry Review articles: How pure is your aspirin? (Volume 6, edition 3); What is chromatography? (Volume 8, edition 2); Antarctic atmospheric chemistry (Volume 13, edition 2); Drugs on money (Volume 13, edition 4); Thin-layer chromatography (Volume 14, edition 3); Body oddities: the chemical reactions of eating (Volume 21, edition 1); Body oddities: the chemical reactions of eating (Volume21, edition 4)