Yr13 Chemistry

MAGHULL HIGH SCHOOL – CURRICULUM MAP

	Sequence		
TOPIC (S) **Structure of Molecules**	1. Optical Isomerism 2. Aldehydes and Ketones 3. Carboxylic Acids and Esters 4. Acylation 5. Preparation of pure organic solid and liquid required practical	6. Aromatic Chemistry Bonding 7. Electrophilic Substitution 8. Amines 9. Polymers 10. Biodegradability and disposal of polymers	11. Amino Acids 12. Proteins 13. Enzymes 14. DNA 15. Action of anticancer drugs
Knowledge & Skills development	• Draw the structural formulas and displayed formulas of enantiomers • Understand how racemic mixtures (racemates) are formed and why they are optically inactive • Chemical tests to distinguish between aldehydes and ketones including Fehling's solution and Tollens' reagent • Write overall equations for reduction reactions using [H] as the reductant • Outline the nucleophilic addition mechanism for reduction reactions with NaBH4 (the nucleophile should be shown as H–) • Write overall equations for the formation of hydroxynitriles using HCN • Outline the nucleophilic addition mechanism for the reaction with KCN followed by dilute acid • Explain why nucleophilic addition reactions of KCN, followed by dilute acid, can produce a mixture of enantiomers • The structure of carboxylic acids and esters • The reactions and uses of carboxylic acids and esters • The production of biodiesel • The structure of acid anhydrides, acyl chlorides and amides. • Outline the mechanism of nucleophilic addition–elimination reactions of acyl chlorides with water, alcohols, ammonia and primary amines • The nature of the bonding in a benzene ring • Preparation of a pure organic solid and test of its purity and a pure organic liquid. • Use thermochemical evidence from enthalpies of hydrogenation to account for this extra stability	• Outline the mechanisms of nucleophilic substitution reactions and the nucleophilic addition–elimination reactions of ammonia and primary amines with acyl chlorides. • The formation of condensation polymers • Draw the repeating unit from monomer structure(s) • Draw the repeating unit from a section of the polymer chain • Draw the structure(s) of the monomer(s) from a section of the polymer • Explain the nature of the intermolecular forces between molecules of condensation polymers. • Explain why polyesters and polyamides can be hydrolysed but polyalkenes cannot • Draw the structures of amino acids as zwitterions and the ions formed from amino acids in acid and alkaline solutions • Draw the structure of a peptide formed from up to three amino acids • Draw the structure of the amino acids formed by hydrolysis of a peptide • Identify primary, secondary and tertiary structures in diagrams • Explain how these structures are maintained by hydrogen bonding and S–S bonds • Calculate Rf values from a chromatogram • The action of enzymes as catalysts, including the concept of a stereospecific active site that binds to a substrate molecule. • Explain why a stereospecific active site can only bond to one enantiomeric form of a substrate or drug • The structure of nucleotides and DNA • Explain how hydrogen bonding between base pairs leads to the two complementary strands of DNA	

	• Explain why substitution reactions occur in preference to addition reactions. • Outline the electrophilic substitution mechanisms of nitration, including the generation of the nitronium ion acylation using $AlCl_3$ as a catalyst. • Preparation of primary aliphatic amines and aromatic amines • Base properties of amines including explanation of the difference in base strength in terms of the availability of the lone pair of electrons on the N atom		• Explain why cisplatin prevents DNA replication • Explain why such drugs can have adverse effects •		
Assessment / Feedback Opportunities	Exam questions – teacher assessed	Exam questions – self assessed	Extended writing task – teacher assessed	Deep marking of required practical in lab books	Topic assessment
Cultural Capital	• •				
SMSC / Promoting British Values **(Democracy, Liberty, Rule of Law, Tolerance & Respect)**	• •				
Reading opportunities	• Recommended Read: Organic Chemistry: A Very Short Introduction by Graham Patrick				
Key Vocabulary	Independent Variable, Dependent Variable, Control Variables, Method, Conclusion, Precaution, Evaluation, Reliable, Precision, Valid, Anomaly, Describe, Explain, Compare, Analyse, Calculate, Suggest, Absolute, Uncertainty, Error Isomerism, Chirality, Asymetric, Superimpose, Racemic, Aldehydes, Reagent, Reduction, Nucleophillic, Ketones, Enantiomers, Acylation, Delocalisation, Hydrolysis, Inert, Biodegradability, Stereospecific, Enzymes, Peptide, Chromatogram, Nucleotide, Polymer, Cispatin, Replication				
Digital Literacy	The use of excel to plot graphs and analyse data MSOffice35 apps including SharePoint				
Cross-Curricular Links	Numeracy/Maths – averages (means), reading scales, graph plotting, lines of best fit, using and rearranging equations, using scientific calculators				
Careers	Chemical Engineering, Drug Development, Pharmacy, Forensic Scientist, Food Scientist, Environmental Consultant				