West Kirby Grammar School

Curriculum Map – Year 13 – Chemistry (Teacher 2)

Topic name	Term	Skills developed	Link to Subject Content	Prior learning	Next link in curriculum
Optical Isomerism	*Autumn*	MS 4.1, 4.2 and 4.3 Students could be asked to recognise the presence of a chiral centre in a given structure in 2D or 3D forms. They could also be asked to draw the 3D representation of chiral centres in various species. Students understand the origin of optical isomerism. AT a and k PS 1.2 Passing polarised light through a solution of sucrose.	Optical isomerism Asymmetric carbon atom is chiral 3D drawings of +/- enantiomers Optical isomers differ in their effect on plane polarised light. A mixture of equal amounts of enantiomers - racemic mixture (racemate).	A Level 3.3.1 Introduction to Organic Chemistry 3.3.4 Alkenes 3.3.13 Amino Acids	3.3.8 Aldehydes and Ketones Mechanistic attack at the carbonyl group (Hydroxynitriles)
Aldehydes and Ketones	*Autumn*	AT b, d and k PS 2.2 Students could carry out test-tube reactions of Tollens' reagent and Fehling's solution to distinguish aldehydes and ketones. Students should be able to: • write overall equations for reduction reactions using [H] as the reductant • outline the nucleophilic addition mechanism for reduction with $NaBH_4$,nucleophile shown as H^- • write overall equations for the formation of	Tollens' gives a silver mirror with aldehydes and Fehling's changes from blue to red/orange Reduction of aldehydes The nucleophilic addition reactions of carbonyl compounds with KCN, followed by dilute acid, to produce hydroxynitriles. Aldehydes and unsymmetrical ketones form mixtures of	Building on knowledge from AS Alcohols Unit	3.3.14 Organic Synthesis

		hydroxynitriles • 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.	enantiomers when they react with KCN followed by dilute acid. The hazards of using KCN.		
Carboxylic Acids and Derivatives	*Spring*	AT b, d, g, h and k Students could identify an ester by measuring its boiling point, followed by hydrolysis to form the carboxylic acid, which is purified by recrystallisation, and determine its melting point. AT b and k Students make biodiesel. AT d and k PS 2.2 Students record observations from reaction of ethanoyl chloride and ethanoic anhydride with water, ethanol, ammonia and phenylamine. AT b, d, g and h PS 2.1, 2.3 and 4.1 Students carry out the preparation of aspirin, purification by recrystallisation and determination of its melting point.	Esterification Reactions Ester Hydrolysis Biodiesel is produced by reacting vegetable oils with methanol in the presence of a catalyst. The structures of: • acid anhydrides • acyl chlorides • amides. The nucleophilic addition–elimination reactions of water, alcohols, ammonia and primary amines with acyl chlorides and acid anhydrides. Required practical 10 Preparation of:	A Level 3.3.1 Introduction to Organic Chemistry 3.3.5 Alcohols	3.3.14 Organic Synthesis

		Students carry out the purification of impure benzoic acid and determination of its melting point.	-a pure organic solid and test of its purity -a pure organic liquid.		
Aromatic Chemistry	*Spring*	AT b, d, g and h PS 2.1, 2.3 and 4.1 Students could carry out the preparation of methyl 3-nitrobenzoate by nitration of methyl benzoate, purification by recrystallisation and determination of melting point Students should be able to outline the electrophilic substitution mechanisms of: • nitration, including the generation of the nitronium ion • acylation using AlCl3 as a catalyst.	Bonding in a benzene ring Delocalisation and stability Electrophilic substitution Friedel–Crafts acylation reactions	A Level 3.3.1 Introduction to Organic Chemistry 3.3.4 Alkenes	3.3.14 Organic Synthesis
Amines	*Spring*		Preparation of amines Aromatic amines and uses Amines as weak bases and nucleophiles Mechanism of formation of primary, secondary, tertiary amines and	A Level 3.3.1 Introduction to Organic Chemistry 3.3.3 Halogenoalkanes	3.3.14 Organic Synthesis

			quaternary ammonium salts. The nucleophilic addition–elimination reactions		
Polymers Condensation Polymers	*Spring*	AT k PS 1.2 Making nylon 6,6	Condensation polymers reactions : • dicarboxylic acids and diols • dicarboxylic acids and diamines • amino acids. Polyalkenes are chemically inert and non-biodegradable Polyesters and polyamides can be broken down by hydrolysis and are biodegradable Advantages and disadvantages of different methods of disposal of polymers, including recycling	A Level 3.3.1 Introduction to Organic Chemistry 3.3.12 Polymers	N/A
Organic Synthesis	*Summer*		The synthesis of an organic compound can involve several steps Predict the types of reaction steps, reagents and / or mechanisms required to synthesise a given	Brings together knowledge of all organic reactions and uses of products	N/A

			organic molecule.		
Nuclear Magnetic Resonance Spectroscopy	*Summer*	Using data in the Chemistry Data Booklet to suggest possible structures for molecules.	Interpretation of nuclear magnetic resonance (NMR) of ^{13}C or ^{1}H atoms in a molecule.	A Level 3.3.6 Organic Analysis	N/A
Chromatography	*Spring or Summer*	AT a, i and k PS 1.2, 3.2 and 4.1 Students could use thin-layer chromatography to identify analgesics. Students could use thin-layer chromatography to identify transition metal ions in a solution. Calculate R_f values from a chromatogram Compare retention times and R_f values with standards to identify different substances. Required practical 12 Separation of species by thin-layer chromatography. Good to combine with Required Practical 10	Types of chromatography include: • thin-layer chromatography (TLC) • column chromatography (CC) • gas chromatography (GC) Retention times and R_f values are used to identify different substances.	GCSE 4.8 Chemical Analysis	N/A