



Topic Name	Term	Skills Developed	Link to NC Subject Content	Next link in curriculum	Other Notes
3.1.2 Amount of substance	<i>Autumn 1</i>	- MS 0.1 Students carry out calculations using numbers in standard and ordinary form eg using the Avogadro constant. - MS 0.4 Students carry out calculations using the Avogadro constant. - MS 1.1 Students report calculations to an appropriate number of significant figures, given raw data quoted to varying numbers of significant figures. Students understand that calculated results can only be reported to the limits of the least accurate measurement. - MS 0.0 Students understand that the correct units need to be in $pV = nRT$. - MS 2.2, 2.3 and 2.4 Students carry out calculations with the ideal gas equation, including rearranging the ideal gas equation to find unknown quantities. - MS 0.2 Students construct and/or balance equations using ratios. Students calculate percentage yields and atom economies of reactions. - MS 1.2 and 1.3 Students select appropriate titration data (ie identify outliers) in order to calculate mean titres. Students determine	- Relative atomic mass and relative molecular mass - The mole and the Avogadro constant - The ideal gas equation - Empirical and molecular formula - Balanced equations and associated calculations	These skills are needed throughout the course	Required Practicals: 1A Making a Volumetric Solution 1B A Simple Acid Base Titration



		uncertainty when two burette readings are used to calculate a titre value.			
3.3.1 Introduction to Organic Chemistry	Autumn 2	- MS 4.2 Students given the structure of one isomer can draw further isomers. Various representations can be used to give the opportunity to identify those that are isomeric. - MS 4.1, 4.2 and 4.3 Students understand the origin of E–Z isomerism. Students can draw different forms of isomers.	- Nomenclature - Reaction mechanisms - Isomerism	This content is needed before all other Organic Chemistry can be successfully understood	
3.3.2 Alkanes	Autumn 2		- Fractional distillation of crude oil - Modification of alkanes by cracking - Combustion of alkanes - Chlorination of alkanes	3.3.3 Halogenoalkanes	
3.3.3 Halogenoalkanes	Spring 1	Research opportunity Students could investigate the role of chemists in the introduction of legislation to ban the use of CFCs and in finding replacements.	- Nucleophilic substitution - Elimination - Ozone depletion	3.3.11 Amines	



3.3.4 Alkenes	Spring 1		• Structure, bonding and reactivity • Addition reactions of alkenes • Addition polymers •	• Y12 Alcohols	
3.3.5 Alcohols	Spring 2	• Students could carry out the preparation of an aldehyde by the oxidation of a primary alcohol. • Students could carry out the preparation of a carboxylic acid by the oxidation of a primary alcohol.	• Alcohol production • Oxidation of alcohols • Elimination	• 3.3.12 Polymers	Required practicals: 5A Distillation of a product from a reaction – production of Cyclohexene from Cyclohexanol AND 5B Preparation of Ethanal from Ethanol
3.3.6 Organic Analysis	Summer 1	• Students should be able to use data in the Chemistry Data Sheet or Booklet to suggest possible structures for molecules.	• Identification of functional groups by test-tube reactions • Mass spectrometry • Infrared spectroscopy	• 3.3.15 NMR Spectroscopy	Required practical: 6. Tests for alcohol, aldehyde, alkene, halogenoalkane and carboxylic acid



3.3.7 Optical Isomerism (A-level only)	Summer 1	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.	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).	3.3.8 Aldehydes & Ketones - Mechanistic attack at the carbonyl group (Hydroxynitriles) 3.3.13 Amino acids, Proteins & DNA	



3.3.13 Amino Acids, Proteins and DNA (A-level only)	Summer 2	Research opportunity Students could research problems associated with the disposal of different polymers.	- Amino acids (A-level only) - Proteins (A-level only) - Enzymes (A-level only) - DNA (A-level only) - Action of anticancer drugs (A-level only)	Y13 Condensation Polymerisation	