Topic 20 – Chromatography and Spectroscopy

* I can appreciate that scientists have developed a range of analytical techniques which together enable the structures of new compounds to be confirmed
* I understand that Nuclear Magnetic Resonance (NMR) gives information about the position of 13C or 1H atoms in a molecule, that 13C NMR gives simpler spectra than 1H NMR spectra, the use of the δ scale for recording chemical shift, which depends on the molecular environment, that integrated spectra indicate the relative numbers of 1H atoms in different environments
* I can use 1H NMR and 13C NMR spectra and chemical shift data from the Chemistry Data Booklet to suggest possible structures or part structures for molecules, use integration data from 1H NMR spectra to determine the relative numbers of equivalent protons in the molecule and use the n+1 rule to deduce the spin–spin splitting patterns of adjacent, non-equivalent protons, limited to doublet, triplet and quartet formation in aliphatic compounds
* I can state that 1H NMR spectra are obtained using samples dissolved in deuterated solvents or CCl4, describe the use of tetramethylsilane (TMS) as a standard and explain why TMS is a suitable substance to use as a standard
* I can explain that chromatography can be used to separate and identify the components in a mixture and that types of chromatography include thin-layer chromatography (TLC), in which a plate is coated with a solid and a solvent moves up the plate, column chromatography (CC), in which a column is packed with a solid and a solvent moves down the column, and gas chromatography (GC), in which a column is packed with a solid or with a solid coated by a liquid, and a gas is passed through the column under pressure at high temperature
* I can separate species by thin-layer chromatography (required Practical 12)
* I can explain that separation depends on the balance between solubility in the moving phase and retention by the stationary phase, I can compare retention times and Rf values with standards to identify different substances, calculate Rf values from a chromatogram and explain the use of mass spectrometry to analyse the components separated by GC
* I can explain that the mixture of amino acids produced by the hydrolysis of proteins can be separated and identified by thin-layer chromatography and explain that amino acids can be located on a chromatogram using developing agents such as ninhydrin or ultraviolet light and identified by their Rf values