Demonstrate understanding of the properties of organic compounds

Functional Groups

- ◯ identify, draw and name alkanes, alkenes, alkynes, haloalkanes, alcohols, amines, carboxylic acids, amides, esters, acyl (acid) chlorides, ketones and aldehydes
- ◯ define and draw constitutional (structural) isomers
- ◯ define and draw primary, secondary and tertiary isomers e.g. alcohols and haloalkanes; and amines
- ◯ define the term optical isomer (enantiomer)
- ◯ draw enantiomers using 3D (wedge and dash) structures
- ◯ describe why a chiral carbon atom is required for a molecule to exist as optical isomers (enantiomers); non-superimposable mirror images
- ◯ describe and explain the similarities and differences between pairs of optical isomers (enantiomers)
- ◯ describe how the rotation of plane-polarised light can be used to distinguish between enantiomers

Reactions

- ◯ describe addition reactions in terms of: the molecules undergo addition reactions; what happens during addition reactions; the reagents used Br_2, H_2/Pt ; the possible products:
- ◯ explain why there can be two products in an addition reaction
- ◯ predict major and minor products using Markovnikov's rule
- ◯ describe elimination reactions in terms of: what molecules undergo elimination reactions; what happens during elimination reactions; reagents used conc H_2SO_4, KOH(alc); the possible products:
- ◯ explain why there can be two products in an elimination reaction
- ◯ predict the major and minor products using Saytzeff's rule
- ◯ describe oxidation reactions in terms of: what molecules undergo oxidation; what happens during oxidation; reagents used (MnO_4^-/H^+, $Cr_2O_7^{2-}$(aq), Tollen's, Fehling's/Benedict's; the possible products
- ◯ describe reduction reactions in terms of: what molecules undergo reduction; what happens during reduction; reagent used for reduction reactions, $NaBH_4$; the possible products
- ◯ describe substitution reactions in terms of: what molecules undergo substitution; what happens during substitution; reagents used conc HX, $SOCl_2$, NaOH(aq), KOH(aq), conc NH_3, amines, alcohols, H_2O/H^+, H_2O/OH^-; the possible products
- ◯ substitution reactions include esterification, condensation, hydrolysis, and polymerisation
- ◯ predict and name the products of neutralisation reactions of carboxylic acids
- ◯ predict and name the products of neutralisation reactions of amines
- ◯ explain condensation reactions to form esters (including triglycerides), amides, peptides and predict the products of condensation reactions
- ◯ describe, explain and predict the products of hydrolysis reactions in both basic H_2O/OH^- and acidic H_2O/H^+ solutions (esters, amides, polyesters, polyamides, peptides)

Apparatus

- ◯ draw and identify distillation apparatus
- ◯ describe and explain the purpose of distillation in the preparation of an aldehyde
- ◯ draw and identify reflux apparatus
- ◯ describe and explain the purpose of heating under reflux
- ◯ identify a separating funnel and describe and explain the purpose of a separating funnel in an organic preparation
- ◯ explain the purpose of adding HCO_3^-(aq) or CO_3^{2-}(aq) in an organic preparation
- ◯ explain the purpose of adding an anhydrous salt in an organic preparation
- ◯ describe and explain the purpose of distillation for purification of a product

Polymers

- ◯ define the term addition polymer (L2)
- ◯ define the term condensation polymer
- ◯ explain the need for both monomers to have two functional groups e.g. H_2N-R-NH_2 and ClOC-R-COCl (or one monomer with 2 different functional groups e.g. HO-R-COOH) when making a condensation polymer
- ◯ predict the polymer that would be formed, given monomers, and vice versa
- ◯ predict the peptide that would be formed, given amino acid monomers, and vice versa

Identification Tests

- ◯ describe and explain how to identify acyl/acid chlorides by adding water
- ◯ recall which small polar organic compounds will be water soluble
- ◯ describe the observations when both polar and non-polar organic liquids are added to water
- ◯ describe and explain which compounds will react with red and/or blue litmus or UI paper
- ◯ describe and explain which compounds will react with a hydrogen carbonate or carbonate
- ◯ describe and explain how bromine water can be used to distinguish between alkenes and alkanes
- ◯ describe and explain how primary and secondary can be distinguished from and tertiary alcohols with acidified dichromate or permanganate
- ◯ describe and explain how Tollen's or Fehling's solution can be used to distinguish between aldehydes and ketones; identify any product formed
- ◯ describe colour changes that accompany identification reactions
- ◯ describe how melting point and boiling point might be used to distinguish between organic compounds