Topic 17 - Carboxylic Acids, Amines, Esters and Acylation

* I can describe the structures of carboxylic acids, esters, acid anhydrides, acyl chlorides and amides
* I can describe carboxylic acids as weak acids which liberate CO2 from carbonates
* I can outline the preparation of primary aliphatic amines by the reaction of ammonia with halogenoalkanes and by the reduction of nitriles
* I can describe amines are weak bases and I can explain the difference in base strength between ammonia and primary aliphatic amines in terms of the availability of the lone pair of electrons on the N atom
* I can describe the reaction of carboxylic acids and alcohols, in the presence of an acid catalyst, to give esters
* I can describe the nucleophilic addition–elimination reactions of water, alcohols, ammonia and primary amines with acyl chlorides and acid anhydrides and outline the mechanism of the nucleophilic addition–elimination reactions of acyl chlorides with water, alcohols, ammonia and primary amines
* I can describe the industrial advantages of ethanoic anhydride over ethanoyl chloride in the manufacture of the drug aspirin
* I can describe amines as nucleophiles and describe the nucleophilic substitution reactions of ammonia and amines with halogenoalkanes to form primary, secondary, tertiary amines and quaternary ammonium salts
* I can describe the use of quaternary ammonium salts as cationic surfactants.
* I can describe common uses of esters (eg in solvents, plasticisers, perfumes and food flavourings)
* I can describe the hydrolysis of esters in acid or alkaline conditions to form alcohols and carboxylic acids or salts of carboxylic acids
* I can describe vegetable oils and animal fats as esters of propane-1,2,3-triol (glycerol), which can be hydrolysed in alkaline conditions to give soap (salts of long-chain carboxylic acids) and glycerol
* I can describe biodiesel as a mixture of methyl esters of long-chain carboxylic acids, which is produced by reacting vegetable oils with methanol in the presence of a catalyst
* I can prepare a pure organic solid and test its purity (Required Practical 10a) and I can prepare a pure organic liquid (Required Practical 10b)