



## **Some Families of Organic Compound**

**Chemistry – Leaving Cert**

**Quick Notes**

## Some Families of Organic Compound

Chloroalkanes are compounds in which one or more of hydrogen atoms in an alkane molecule have been replaced by a chlorine atom. Most chloroalkanes are liquids at room temperature. They are used as solvents as they are not soluble in water but readily dissolve in non-polar solvents. A functional group is an atom or a group of atoms which is responsible for the characteristic properties of a series of organic compounds. The  $\text{-OH}$  group is the functional group of alcohols. A primary alcohol is one where the carbon atom joined to the  $\text{-OH}$  group is attached to only one other carbon atom e.g. ethanol. Secondary alcohol means that carbon atom is attached to two other carbon atoms e.g. propan-2-ol. All alcohols have higher boiling points than the corresponding alkanes and hence are liquids at room temperature due to the presence of hydrogen bonding. The solubility of alcohols in water decreases with the length of the carbon chain due to the insoluble alkyl portion of the molecule. The  $\text{-CHO}$  group is the functional group of aldehydes e.g. methanal, ethanal. Benzaldehyde is an aromatic aldehyde and is found in almonds. Aldehydes have higher boiling points than the corresponding alkanes due to dipole-dipole bonding forces between the molecules. Most aldehydes are liquids at room temperature but methanal is a gas at room temperature. The solubility of aldehydes in water decreases with the length of the carbon chain due to the insoluble alkyl portion of the molecule. The  $\text{C=O}$  group is the functional group of ketones e.g. propanone, butanone. Ketones have higher boiling points than the corresponding alkanes due to dipole-dipole forces between the ketone molecules. The solubility of ketones in water decreases with the length of the carbon chain due to the insoluble alkyl portion of the molecule. The  $\text{-COOH}$  group is the functional group of carboxylic acids e.g. methanoic acid, ethanoic acid. There is a greater amount of hydrogen bonding in carboxylic acids than in alcohols, giving carboxylic acids higher boiling points than the corresponding alcohols. The lower members of the carboxylic acids are highly soluble in water due to this hydrogen bonding. Esters form another series of homologous compounds of the general formula  $\text{RCOOR'}$  e.g. methyl ethanoate, ethyl ethanoate. Esters are prepared in the lab by the reaction between an alcohol and a carboxylic acid. Esters are volatile liquids with pleasant fruity smells. Fats and oils are naturally occurring esters. Hydrogen bonding takes place between the ester molecule and the water molecule causing esters to be soluble in water but hydrogen bonding is not possible between the molecules of esters meaning they have low boiling points. Steam distillation is used to separate the oils found in some plants from the plants. It involves carrying out distillation in

a current of steam and the mixture of oil and steam is then condensed by passing it through a Liebig condenser. The two liquids are then separated from each other using a separating funnel. Solvent extraction is sometimes used to isolate the oil if the oil droplets are dispersed throughout the water. This is carried out by adding an organic solvent such as cyclohexane that dissolves the oil but does not mix with water to the emulsion and shaking up with it. The organic solvent is then separated from the water using a separating funnel and the organic solvent is then allowed to evaporate leaving the pure oil behind. The process of steam distillation is used to extract clove oil from cloves.