

**Alcohol, Aldehyde, ketones and
carboxylic acid.**

4-The text

Alcohols : organic compounds that contain the hydroxyl function group, attached to carbon chain.

Properties of alcohols:- the – OH group allows alcohols to hydrogen bond, which causes alcohols to have higher boiling points than alkanes lower alcohols are miscible with water but higher alcohols immiscible with water such as cyclohexan, Benzyl alcohol , All lower alcohol are poisonous excepted ethanol has less toxic, mainly inflammable Liquid.

Reaction of alcohols:-

- 1- Dehydration of alcohols to form alkenes .
- 2- Formation of ether
- 3- Oxidation of primary alcohols to form aldehydes.
- 4- Oxidation of secondary alcohols to form ketones.
- 5- Alcohol with carboxylic acid to form ester.

Classification of alcohols:-

- 1- Primary (1°) alcohol : an alcohol that has one alkyl group bonded to alcohol carbon atom. (1- Butanol)
- 2- Secondary (2°) alcohol: An alcohol that has two alkyl groups bonded to the carbon atom with the – OH group. (2- Butanol).
- 3- Tertiary (3°) alcohol: An alcohol that has three alkyl groups bonded to the carbon atom with the – OH. (2- Methyl-2-propanol) .

Naming alcohols:- in the IUPAC system, the alcohol family is indicated by the **OL** ending .

Form of Ethyl alcohols:-

- 1- Rectified ethanol [100% Absolute ethanol used for scientific test and research].
- 2- Methylated spirits or or denatured spirit [95% ethanol +5% Methyl alcohol used in stores and for cleaning].
- 3- Surgical spirit [70% solution of ethyl alcohol together with oil of winter green and formaldehyde, used for cleansing the skin prior to injections and surgery.

Aldehyde and ketones are organic compounds which contain the carbonyl group ($C=O$) as the functional group . In aldehydes, the carbonyl group appears at the end of carbon chains. In ketones, the carbonyl group occurs between two alkyl groups. In the IUPAC system, the e in the corresponding alkane is replaced with **al** for aldehydes and **one** for ketones. Many aldehydes and ketones are found in biological systems, flavorings and drugs.

Properties of Aldehydes and ketones:-

Formaldehyde is gas, lower aldehyde and ketones are neutral liquid, less soluble in water and lower boiling point than corresponding alcohol. And possessing characteristic pungent odour .

- * The oxidation of a primary alcohol yields an aldehyde.
- * Aldehydes are good reducing agents.
- * The oxidation of a secondary alcohol yields a ketone.
- * The oxidation of an aldehyde yields an acid.

Reaction of aldehydes and ketones:-

- 1- Oxidation of aldehydes to carboxylic acid.
- 2- Reduction of aldehydes to primary alcohols.
- 3- Reduction of ketones to secondary alcohols.
- 4- Addition of water and alcohol to the carbonyl group of aldehydes and ketones.

Quiz/1:- How are alcohols classified? Give an example

Note:- check your answer in key answer.

Carboxylic acid :- A class of organic compounds that contains the carboxyl functional group. The general formula for an acid is RCOOH . The IUPAC names for acids end in – oic acid.