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Functional Group of Carbon Compounds:

We have studied the chemistry of carbon and its compounds such as methane, Ethene (ethylene) and Ethyne (acetylene).

All these compounds are made of carbon and hydrogen only. Now we shall focus on an important class of organic compounds that contain oxygen in addition to carbon and hydrogen. Oxygen may be present in these compounds as an element of the functional group.

Functional Group:

An atom or a group of atoms in an organic molecule that is responsible for the compound's characteristic reactions and determines its properties is known as a functional group.

Note:

- (i) The functional group in an organic molecule is the most reactive part of the molecule.
- (ii) The chemical properties of an organic compound are determined by the functional group of its molecule while the physical properties of the compound are determined by the remaining portion of the molecule.

Some of the important oxygen-containing functional groups and their corresponding compounds are discussed below.

(It should be noted here that instead of oxygen, functional group may also contain S, N, Cl or other element. You will learn more about such functional groups in higher classes.)

1. Hydroxyl group (-OH):

All organic compounds containing -OH as the functional group are known as alcohols.

Example:

Methanol (CH_3OH)

Ethanol ($\text{C}_2\text{H}_5\text{OH}$)

Propanol ($\text{C}_3\text{H}_7\text{OH}$), etc., are alcohols.

Most of the characteristic properties of alcohols are due to the presence of the -OH group.

2. Aldehyde group (-CHO):

Organic compounds containing -CHO as the functional group are known as aldehydes.

Example:

Methanal (HCHO)

Ethanal (CH_3CHO)

Propanal ($\text{CH}_3\text{CH}_2\text{CHO}$), etc, are aldehydes.

3. Carbonyl or ketone group (> CO):

Organic compounds containing > CO as the functional group are called ketones.

Example: Propanone (CH_3COCH_3) is a ketone.

4. Carboxyl group (-COOH):

All organic acids contain carboxyl group as the functional group. Hence, they are also called carboxylic acids.

Example:

Methanoic acid (HCOOH)

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Ethanoic acid (CH_3COOH)

Propanoic acid ($\text{CH}_3\text{CH}_2\text{COOH}$) etc., contain the carboxyl ($-\text{COOH}$) group.

5. Ester group (-COO-):

Methyl ethanoate ($\text{CH}_3\text{COOCH}_3$)

Ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$) are examples of ester.

6. Ether group (-O-):

All ethers contain -O- as the functional group.

Examples of ether are di-methyl ether (CH_3OCH_3)