



Alcohol

Alcohols are compounds with at least one hydroxyl group (OH). They fall into different classes depending on how the OH group is positioned on the chain of carbon atoms.

- **Primary alcohols** have two hydrogen atoms on the carbon joined to the OH groups.
- **Secondary alcohols** have only one hydrogen atom on the carbon joined to the OH group.
- **Tertiary alcohols** have no hydrogen atoms on the carbon attached to the OH molecule.

Giving names to alcohol follows two rules.

The **systematic nomenclature** for alcohols adds the suffix *-ol* to the name of the parent alkane and uses a number to identify the carbon atom that carries the OH group.

Instead the common names for alcohols are based on the name of the **alkyl group**.

Therefore methanol (CH_3OH) is commonly known as methyl alcohol, ethanol ($\text{CH}_3\text{CH}_2\text{OH}$) is also called ethyl alcohol, and 2-propanol ($\text{CH}_3\text{CHOHCH}_3$) is also named isopropyl alcohol. Methanol is highly toxic, whereas ethanol, or ethyl alcohol, is the alcohol associated with "alcoholic" drinks. It is made by adding yeast to solutions that are rich in either sugars or starches. The yeast cells obtain energy from enzymecatalyzed reactions that convert sugar or starch to ethanol and carbon dioxide. Ethanol is not as toxic as methanol, but it is

still dangerous: a high increase in the level of alcohol in the blood can lead to coma or death. Alcohols have **properties** between the extremes of water and hydrocarbon: they are soluble in water when their hydrocarbon chain is shorter. Instead, as the hydrocarbon chain becomes longer, they become less soluble in water. Moreover they usually have higher boiling points than alkanes with similar molecular weight: ethanol, for example, reaches boiling point at 78.5°C whereas propane, with the same molecular weight, boils at -42.1°C .

Phenols are another class of alcohols. They are strong disinfectants, whose derivatives are still employed today. The difference between alcohols and phenols is that the latter have the OH group attached to an aromatic ring, a structure formed by six carbon atoms.

Systematic nomenclature corresponds to the IUPAC system, established as a unique way to name compounds.

An **alkyl group** is group such as methyl CH_3 or ethyl CH_3CH_2 . These are groups that contain chains of carbon atoms which may be branched. In primary alcohols the carbon atom carrying the OH group is attached to one alkyl group, in secondary alcohols to two and in tertiary alcohols to three.



ACTIVITIES

1 Write full sentences to describe the following items.

- 1 Alkyl group
- 2 Systematic nomenclature
- 3 Production of ethanol

4 Boiling point of ethanol

- 5 Phenols
- 6 Position of OH group in phenols