

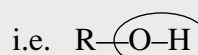
Characteristics and Properties of Alcohols

- Alcohols (or alkanols) are recognised by the presence of the -OH functional group. Their general formula is $\text{C}_n\text{H}_{2n+1}\text{OH}$ or simply R-OH (where R is a hydrocarbon chain, e.g. $\text{CH}_3\text{-}$, $\text{C}_2\text{H}_5\text{-}$, $\text{C}_3\text{H}_7\text{-}$, etc).
- The position of the -OH group determines whether the alcohol is 1° , 2° or 3° .
- Alcohols are named by using an -ol suffix and indicating where the functional group is on the carbon chain, e.g. butan-2-ol

4 carbon atoms in longest chain

-OH functional group attached to second carbon on chain

- Alcohols contain polar molecules due to the highly electronegative oxygen atom in the -OH group and the symmetry of the molecule.



highly polar end of molecule

- Because they are comprised of polar molecules, alcohol molecules exert stronger attractions on each other than do hydrocarbon molecules. As a result of this, alcohols have higher boiling points than corresponding hydrocarbons.
- Lower members of the alcohol series (e.g. 1-3 carbon atoms) dissolve in water but higher members are insoluble. When mixed with water, they do not release H^+ or OH^- ions into the water.
- They are non-conductors of electricity.
- Alcohols are important fuels and solvents.

Exercises

On the Alcohol!

- Complete the following table for alcohols. (The first one has been done for you)
Note: The position of the -OH functional group on the carbon chain must be indicated.

NAME	MOLECULAR FORMULA	CONDENSED STRUCTURAL FORMULA
methanol	CH_4O	CH_3OH
	$\text{C}_2\text{H}_6\text{O}$	
	$\text{C}_3\text{H}_8\text{O}$	
	$\text{C}_4\text{H}_{10}\text{O}$	
	$\text{C}_5\text{H}_{12}\text{O}$	
	$\text{C}_6\text{H}_{14}\text{O}$	
	$\text{C}_7\text{H}_{16}\text{O}$	
	$\text{C}_8\text{H}_{18}\text{O}$	

2. The table below provides a list of the first six alcohols setting out their names and boiling point in degrees Celsius.
- (a) Complete the table by working out the molecular formula and relative molecular mass (M_r) for each alcohol.
- (b) Plot a graph of boiling point (vertical axis) against the molecular mass of each alcohol. Use your graph to find the boiling point of butan-1-ol.

ALCOHOL	MOLECULAR FORMULA	M_r	BOILING POINT (°C)
methanol			65
ethanol			78
propan-1-ol			97
butan-1-ol			
pentan-1-ol			138
hexan-1-ol			158

