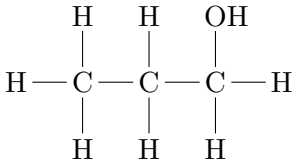
Contents

1 Primary, Secondary, and Tertiary Alcohols

Alcohols can be divided into three categories depending on where the *-OH* group is located.

1.1 Primary Alcohols

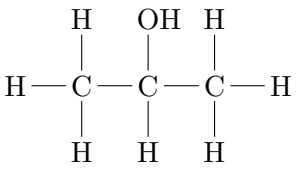
The primary alcohol has its *-OH* group on a carbon that is only connected to *one* other carbon.



Butan-1-ol, an example of a primary alcohol

1.2 Secondary Alcohols

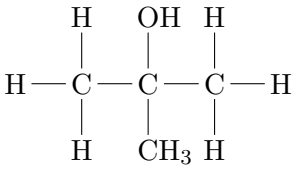
The secondary alcohol has its *-OH* group on a carbon that is connected to *two* other carbons.



Butan-2-ol, an example of a secondary alcohol

1.3 Tertiary Alcohols

The tertiary alcohol has its *-OH* group on a carbon that is connected to *two* other carbons.



2-methylbutan-2-ol, an example of a tertiary alcohol

1.4 Oxidation of Alcohols

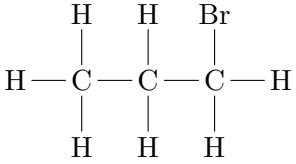
When a *primary alcohol* is oxidised, an aldehyde is formed.[1] When a *secondary alcohol* is oxidised, a ketone is formed. A *tertiary alcohol* is unlikely to react in this way.

2 Primary, Secondary, and Tertiary Halogenoalkanes

Halogenoalkanes can be divided into three categories depending on where the halogen is located.

2.1 Primary Halogenoalkanes

The primary alcohol has its halogen on a carbon that is only connected to *one* other carbon.

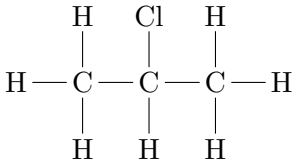


1-bromobutane, an example of a primary halogenoalkane

[1] In organic chemistry, oxidation is defined as loss/gain or hydrogen/oxygen, not loss/gain of electrons/protons

2.2 Secondary Halogenoalkanes

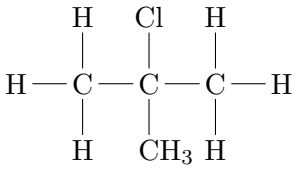
The secondary alcohol has its -*OH* group on a carbon that is connected to *two* other carbons.



2-chlorobutane, an example of a secondary halogenoalkane

2.3 Tertiary Halogenoalkanes

The secondary alcohol has its -*OH* group on a carbon that is connected to *two* other carbons.



2-methyl-2-chlorobutane, an example of a secondary alcohol

2.4 Reactions between Halogenoalkanes and Sodium Hydroxide

When a *primary halogenoalkane* reacts with NaOH, we expect a *primary alcohol* and NaCl to be formed. When a *secondary halogenoalkane* reacts with NaOH, we expect a *secondary alcohol* and NaCl to be formed. When a *tertiary alcohol* reacts with NaOH, we expect a *tertiary alcohol* and NaCl to be formed.

3 Primary, Secondary, and Tertiary Amines

Amines can be divided into three categories depending on where the nitrogen is located.

3.1 Primary Amines

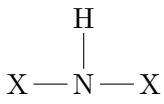
The primary amine has its nitrogen connected to *one* other carbon.

$X - NH_2$

Where X is an alkyl group.

3.2 Secondary Amines

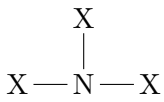
The secondary amine has its nitrogen connected to *two* other carbons.



Where X is an alkyl group.

3.3 Tertiary Amines

The tertiary amine has its nitrogen connected to *three* other carbons.



Where X is an alkyl group.

4 Isomerism

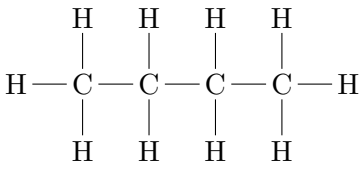
4.1 Structural

Structural isomers have the *same molecular formula but different structura formula.* The properties also differ between different isomers. For example, straight isomers have *higher* boiling and melting points than their branched[2] isomers, due to the straight isomers having *higher london dispersion forces.*

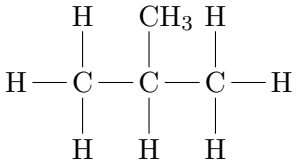
[2]With substituent groups attached

4.1.1 Examples

Name all isomers of C_4H_{10}



n-butane (straight)



2-methylpropane

4.2 Functional

Functional isomers are a subtype of structural isomers. They have all the properties of structural isomers, as well as different functional groups. Propanal and Propanone both have the formula C_3H_6O, but different structual formulae and functional groups. They are therefore functional isomers. This is true for all aldehydes and ketones with the same alkane "base".

The same applies to alcohols & ethers and esters & carboxylic acids.