

Unit 10 Alcohols and Organic Analysis (Paper 2 & 3)

10.1 Alcohols

Alcohol Production

Alcohols are produced industrially by hydration of alkenes in the presence of an acid catalyst.

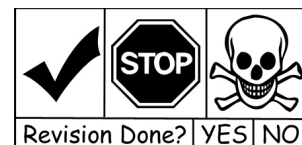
Ethanol is produced industrially by fermentation of glucose.

The conditions for this process.

Ethanol produced industrially by fermentation is separated by fractional distillation and can then be used as a biofuel.

You should be able to:

- explain the meaning of the term biofuel
- justify the conditions used in the production of ethanol by fermentation of glucose
- write equations to support the statement that ethanol produced by fermentation is a carbon-neutral fuel and give reasons why this statement is **not** valid
- outline the mechanism for the formation of an alcohol by the reaction of an alkene with steam in the presence of an acid catalyst
- discuss the environmental (including ethical) issues linked to decision making about biofuel use.



Oxidation of Alcohols

Alcohols are classified as primary, secondary and tertiary.

Primary alcohols can be oxidised to aldehydes which can be further oxidised to carboxylic acids.

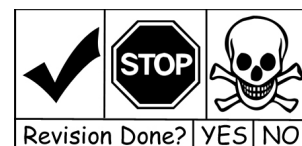
Secondary alcohols can be oxidised to ketones.

Tertiary alcohols are not easily oxidised.

Acidified potassium dichromate(VI) is a suitable oxidising agent.

You should be able to:

- write equations for these oxidation reactions (**[O] as oxidant is acceptable**)
- explain how the method used to oxidise a primary alcohol determines whether an aldehyde or carboxylic acid is obtained
- use chemical tests to distinguish between aldehydes and ketones including Fehling's solution and Tollens' reagent.

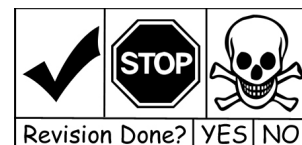


Elimination

Alkenes can be formed from alcohols by acid-catalysed elimination reactions.

Alkenes produced by this method can be used to produce addition polymers without using monomers derived from crude oil.

You should be able to outline the mechanism for the elimination of water from alcohols.



10.2 Organic analysis

Identification of functional groups by test-tube reactions

The reactions of functional groups listed in the specification.

You should be able to identify the functional groups using reactions in the specification

Mass spectrometry

Mass spectrometry can be used to determine the molecular formula of a compound.

You should be able to use precise atomic masses and the precise molecular mass to determine the molecular formula of a compound.

Infrared spectroscopy

Bonds in a molecule absorb infrared radiation at characteristic wavenumbers.

'Fingerprinting' allows identification of a molecule by comparison of spectra.

You should be able to:

- use infrared spectra and the Chemistry Data Sheet or Booklet to identify particular bonds, and therefore functional groups, and also to identify impurities.

The link between absorption of infrared radiation by bonds in CO₂, methane and water vapour and global warming.

