Edexcel GCSE Chemistry

Topic 9: Separate chemistry 2

Alcohols and carboxylic acids

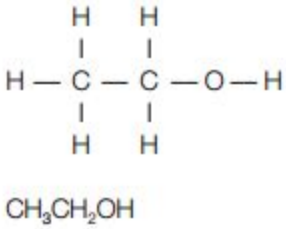
Notes

9.26C Recall the formulae of molecules of the alcohols, methanol, ethanol, propanol (propan-1-ol only) and butanol (butan-1-ol only), and draw the structures of these molecules, showing all covalent bonds

- Alcohols contain the functional group –OH
- The first 4 members of the series are methanol, ethanol, propanol and butanol

methanol	CH_3OH
ethanol	CH_3CH_2OH
propanol	$CH_3CH_2CH_2OH$
butanol	$CH_3CH_2CH_2CH_2OH$

9.27C Recall that the functional group in alcohols is –OH

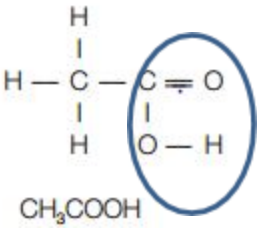


9.28C Core Practical: Investigate the temperature rise produced in a known mass of water by the combustion of the alcohols ethanol, propanol, butanol, and pentanol

- in this experiment, you should find that the temperature is raised more as the chain length of the alcohols increases, because the combustion of longer chain alcohols releases more energy

9.29C Recall the formulae of molecules of the carboxylic acids, methanoic, ethanoic, propanoic and butanoic acids, and draw the structures of these molecules, showing all covalent bonds

- Ethanoic acid is a member of the carboxylic acids, they have the functional group –COOH.
- First four members are: methanoic acid, ethanoic acid, propanoic acid and butanoic acid



methanoic acid	CHOOH
ethanoic acid	CH_3COOH
propanoic acid	CH_3CH_2COOH
butanoic acid	$CH_3CH_2CH_2COOH$

9.30C Recall that the functional group in carboxylic acids is –COOH

9.31C Recall that ethanol can be oxidized to produce ethanoic acid and extend this to other alcohols (reagents not required)

- Ethanol can be oxidised to form ethanoic acid.
- any alcohol can be oxidised to produce a carboxylic acid (e.g. propanol → propanoic acid)

9.32C Recall members of a given homologous series have similar reactions because their molecules contain the same functional group and use this to predict the products of other members of these series

9.33C Describe the production of ethanol by fermentation of carbohydrates in aqueous solution, using yeast to provide enzymes

- Ethanol can be produced by fermentation with yeast, using renewable sources.
- it is produced from carbohydrates (can be sugars from fruit or starch)
- mixture must be kept warm and under anaerobic conditions (warm- so reaction is fast enough but yeast doesn't denature. Anaerobic- only carbon dioxide and water would be produced if not)

glucose → ethanol + carbon dioxide

$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

9.34C Explain how to obtain a concentrated solution of ethanol by fractional distillation of the fermentation mixture

- Ethanol concentration is about 15% from fermentation, ethanol is separated from the reaction mixture using fractional distillation
  - water and ethanol solution are heated
  - ethanol evaporates first (has a lower boiling point than water), cools, then condenses
  - water left evaporates, cools, then condenses