CAIE IGCSE Chemistry

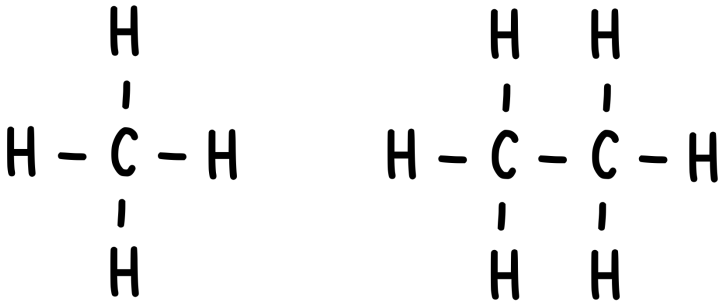
11.2 Naming organic compounds

Notes

Name and draw the displayed formulae of:

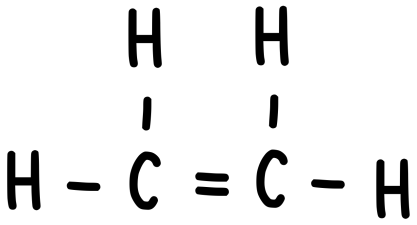
(a) Methane and Ethane

- Methane (CH_4) and ethane (C_2H_6) are both alkanes.



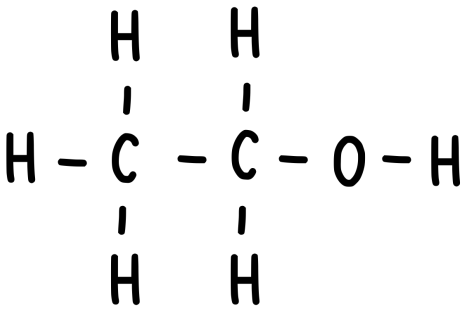
(b) Ethene

- Ethene is an alkene with 2 carbon atoms (the molecular formula C_2H_4) and a double bond between the carbon atoms.



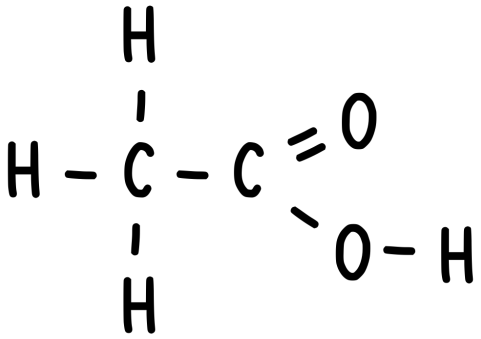
(c) Ethanol

- Ethanol is an alcohol with molecular formula C_2H_5OH so has a hydroxyl group (-OH) attached to one of the carbon atoms



(d) Ethanoic acid

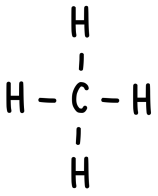
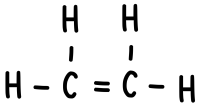
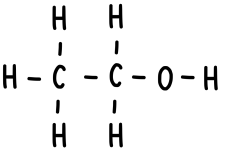
- Ethanoic acid is a carboxylic acid with structural formula CH_3COOH so has a carboxyl group (-COOH) in its structure

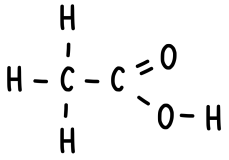


(e) The products of the reactions stated in sections 11.4–11.7

- See notes 11.4-11.7

State the type of compound present, given a chemical name ending in -ane, -ene, -ol, or -oic acid or from a molecular formula or displayed formula

Type of compound	Chemical name ending in	General formula	Example (molecular formula)	Example (displayed formula)
Alkane	-ane	C_nH_{2n+2}	CH_4	
Alkene	-ene	C_nH_{2n}	C_2H_4	
Alcohol	-ol	$C_nH_{2n+1}OH$	C_2H_5OH	

Carboxylic acid	-oic acid	$C_nH_{2n+1}COOH$	CH_3COOH	

(Extended only) Name and draw the structural and displayed formulae of unbranched:

(a) Alkanes

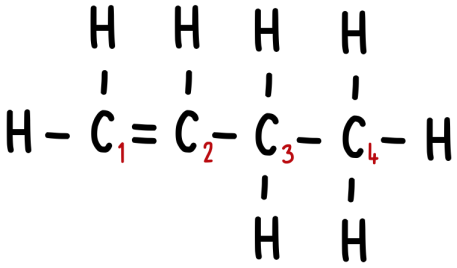
- Naming alkanes is relatively easy as all the names end in -ane
- To know the prefix, count the number of carbon atoms:

Number of carbons	Prefix	Name of alkane
1	meth-	methane
2	eth-	ethane
3	prop-	propane
4	but-	butane
5	pent-	pentane
6	hex-	hexane
7	hept-	heptane
8	oct-	octane

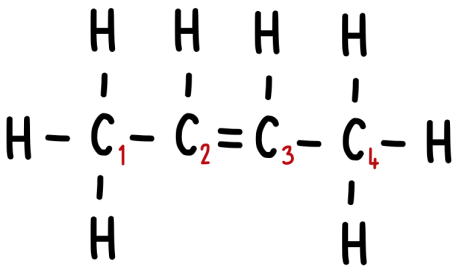
- To draw the displayed formula of alkanes, remember:
  - There are only single carbon-carbon bonds
  - Carbon atoms must have 4 bonds
  - Hydrogen atoms must have 1 bond
  - If there are side groups, e.g. a methyl group, attach it to the correct carbon as numbered in the name of the alkane

(b) Alkenes, including but-1-ene and but-2-ene

- Naming alkenes is relatively easy as all the names end in -ene
- But numbers are included in the name between the prefix (number of carbon atoms) and the suffix -ene, to show which carbon atom the double carbon-carbon bond is attached to
- E.g. But-1-ene has the double carbon=carbon bond on carbon-1 whereas but-2-ene has the double carbon=carbon bond on carbon-2:



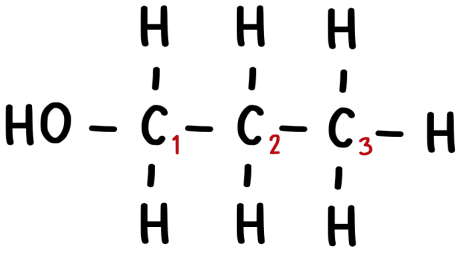
but-1-ene



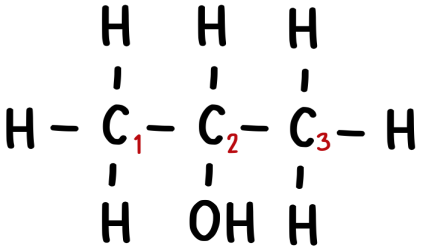
but-2-ene

(c) Alcohols, including propan-1-ol, propan-2-ol, butan-1-ol and butan-2-ol

- All the names of alcohols end in -ol
- But numbers are included in the name between the prefix (number of carbon atoms) and the suffix -ol, to show which carbon the hydroxyl (-OH) group is attached to
- E.g. Propan-1-ol has the hydroxyl group on carbon-1 whereas propan-2-ol has the hydroxyl group on carbon-2:

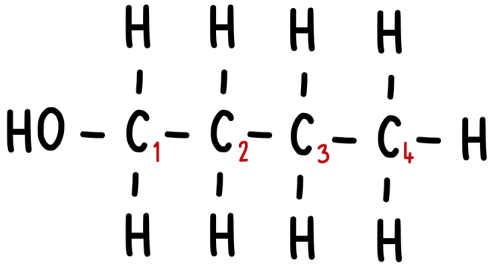


propan-1-ol

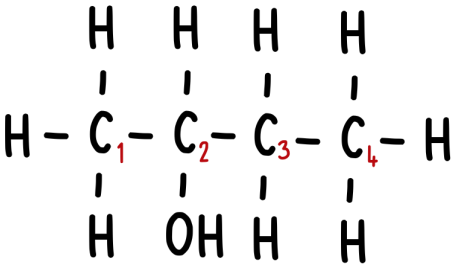


propan-2-ol

- E.g. Butan-1-ol has the hydroxyl group on carbon-1 whereas butan-2-ol has the hydroxyl group on carbon-2:



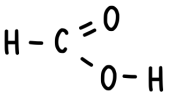
butan-1-ol



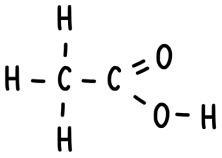
butan-2-ol

(d) Carboxylic acids containing up to four carbon atoms per molecule

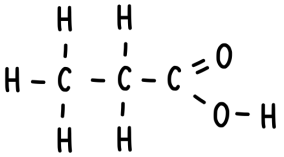
- All the names of carboxylic acids end in -oic acid
- The carboxyl group (-COOH) is always at the end of the carbon chain so there is no need to number where it goes



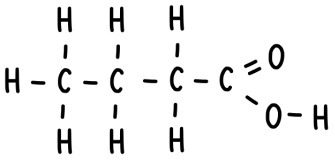
methanoic acid



ethanoic acid



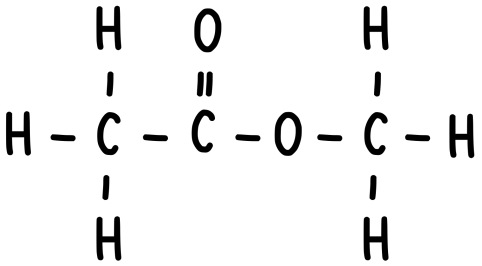
propanoic acid



butanoic acid

(Extended only) Name and draw the displayed formulae of the unbranched esters which can be made from unbranched alcohols and carboxylic acids, each containing up to four carbon atoms

- Unbranched esters are formed from unbranched alcohols and carboxylic acids
- The functional group of esters is -COO which is known as an ester linkage/bond
- To name an ester:
    1. Change the name of the alcohol to end in –yl
    2. Change the name of the carboxylic acid to end in –oate
    3. Alcohol name goes to the front, carboxylic acid name to the back
- E.g. Methyl ethanoate is formed from methanol and ethanoic acid:



methyl ethanoate