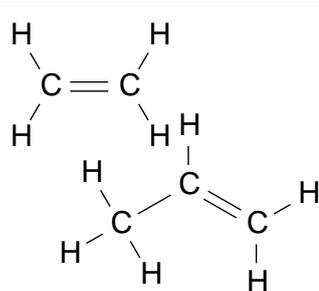


$\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	$\text{C}_4\text{H}_{10}$ $\text{C}_5\text{H}_{12}$ $\text{C}_6\text{H}_{14}$
methane	ethane	propane	butane, pentane, hexane
$\text{C}_7\text{H}_{16}$ $\text{C}_8\text{H}_{18}$	$\text{C}_n\text{H}_{2n+2}$	$\text{C}_n\text{H}_{2n+2}$ • saturated hydrocarbons • insoluble in water	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
heptane octane	alkane general formula	alkanes	ethene
$\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	$\text{C}_n\text{H}_{2n}$	$\text{C}_n\text{H}_{2n}$ • unsaturated hydrocarbons • insoluble in water	Combustion type - in plentiful $\text{O}_2$ with a clean flame to give $\text{CO}_2$ , $\text{H}_2\text{O}$ & maximum amount of energy
propene	alkene general formula	alkenes	complete combustion
Combustion type - in limited $\text{O}_2$ with dirty flame to give C, CO, $\text{CO}_2$ & $\text{H}_2\text{O}$ & less than maximum amount of energy	as the number of C atoms increase in the alkanes, the melting points and boiling points...	hydrocarbons are separated in fractional distillation because they have different...	the shorter the hydrocarbon chain, the _____ its boiling point
incomplete combustion	increase	boiling points / molecular masses	lower

the longer the hydrocarbon chain, the _____ its boiling point	smaller molecules condense at the _____, bigger at the middle, biggest at the _____ of the fractionating column	higher boiling point • less volatile • more viscous • ignites less easily	lower boiling point • more volatile • less viscous • ignites more easily
higher	top bottom	large molecules	small molecules
alkanes e.g. methane, propane & butane, and some bigger alkanes, are used mainly as ...	makes things dirty (sooty); a product of incomplete combustion	large less useful hydrocarbons are broken into smaller and unsaturated molecules by...	cracking produces more molecules that can be used as fuels as well as small, more useful...
fuels	carbon, C	cracking	unsaturated molecules e.g. ethene
molecules with a C=C bond are an important starting points for the manufacture of...	poly(ethene), polypropene, PVC, PTFE are all examples of...	reaction where monomers are joined together to form polymers is called...	hydrocarbons where each C is bonded to the max. no. (4) of other atoms are described as ...
polymers (plastics)	Polymers (plastics)	polymerisation	saturated
hydrocarbons where each C is bonded to less than the max. no. (4) of other atoms are described as...	as no. of C atoms increase in a molecule, m.pt. and b.pt. increase due to greater...	alkane that occurs in natural gas, marsh gas, released by flatulent ruminants	CH <sub>4</sub> is compressed as CNG which is...
unsaturated	weak attractive forces between molecules	methane	compressed natural gas

CH <sub>4</sub> is a linked with global warming and the climate change and is a...	the main ingredients of LPG (liquid petroleum gas) are...	Balance this: $C_3H_8 + \_\_ O_2 \rightarrow \_\_ CO_2 + \_\_ H_2O$	CO is poisonous; there is less O <sub>2</sub> carried by the blood because CO binds to <u>    </u> in red blood cells
greenhouse gas	propane and butane	5O <sub>2</sub> • 3CO <sub>2</sub> • 4H <sub>2</sub> O	haemoglobin
<u>    </u> gas is particularly dangerous because it is colourless, odourless and toxic (poisonous)	<u>    </u> particles can cause irritation of lungs, respiratory problems e.g. bronchitis & asthma	incomplete combustion also wastes <u>    </u> & <u>    </u> because less than the maximum energy is released	products of combustion experiment: lime water tests for...
carbon monoxide CO	carbon, C	fuel and \$\$\$	carbon dioxide
C <sub>n</sub> H <sub>2n</sub> ethene propene	C=C double bond found in alkenes  molecule is described as...	products of combustion experiment: cobalt chloride paper tests for...	products of combustion experiment: iced water is to...
first 2 members of the alkenes	unsaturated	water (blue paper turns pink in water)	condense the water vapour to steam
	alkenes will burn but are not wasted as fuels as are more useful to make other chemicals e.g. ...	name for the type of reactions done by alkenes is <u>        </u> reactions	$nC_2H_4 \rightarrow -(CH_2-CH_2)_n$ represents the process called...
ethene and propene	polymers (plastics)	addition	polymerisation (making polyethene in this example)

the "building blocks" or individual units of the polymer are called....	the polymer poly(propene) is made up from the monomer called...	the polymerisation process requires the use of ____, ____, & a ____	$C_nH_{2n+1}OH$ $CH_3OH$ $C_2H_5OH$
monomers	propene	heat, pressure & a catalyst	first 2 members of the alcohols – methanol, ethanol,
$\begin{array}{c} H \\   \\ H - C - O - H \\   \\ H \end{array}$	$\begin{array}{c} H & H \\   &   \\ H - C - C - O - H \\   &   \\ H & H \end{array}$	$C_2H_5OH$ • colourless liquid • soluble in water • characteristic odour	alcohol used as solvent • fuel • in alcoholic drinks
methanol	ethanol	ethanol	ethanol
ethanol is produced by anaerobic respiration by yeast, a.k.a. ....	first few members of the alcohol family (methanol and ethanol) are _____ in water	fermentation of sugar solution occurs best around ____ - ____°C: yeast contains enzymes	name for a biological catalyst is an ...
fermentation	soluble	25- 35	enzyme
alcohols have higher m.pts and b.pts than the corresponding....	alkanes are used for fuels because...	long molecule made up of many repeating units (monomers)	how ethene molecules join together to form poly(ethene)
alkanes e.g. ethane (g) but ethanol (l)	they burn easily and release a lot of energy	polymer	C=C breaks & single bonds form between ethene molecules

organic molecules that are insoluble in water are	organic molecules that are soluble in water are	microbe that carries out anaerobic respiration / fermentation of sugar	$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ this reaction is...
alkanes and alkenes	alcohols (methanol and ethanol)	yeast (a fungi)	fermentation / anaerobic respiration
type of formula for ethanol  $CH_3CH_2OH$	type of formula for ethanol  $  \begin{array}{c}  H & H \\    &   \\  H-C & -C-O-H \\    &   \\  H & H  \end{array}  $	type of formula for ethanol  $C_2H_5OH$	manufacture of methanol: name of reaction where methane is reacted with steam
condensed structural formula	Structural (shows how each atom is bonded)	molecular formula (shows how many of each atom)	steam reforming
manufacture of methanol: name of reaction where CO reacts with $H_2$	reaction in methanol synthesis that adjusts the ratio of gases $CO_2 + H_2 \rightleftharpoons CO + H_2O$	reaction in methanol synthesis that makes CO & $H_2$ $CH_4 + H_2O \rightarrow CO + 3H_2$	alcohol that is raw material for many other chemicals, and component of methylated spirits
synthesis	water-shift reaction	steam reforming	methanol
alcohol that is used as a solvent, fuel, and in alcoholic drinks			
ethanol			