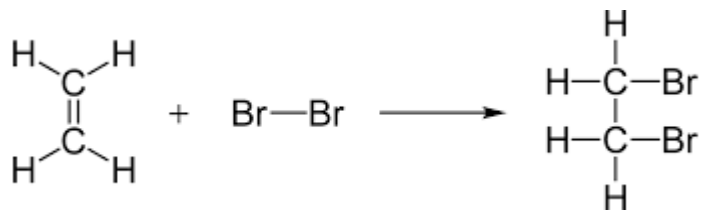
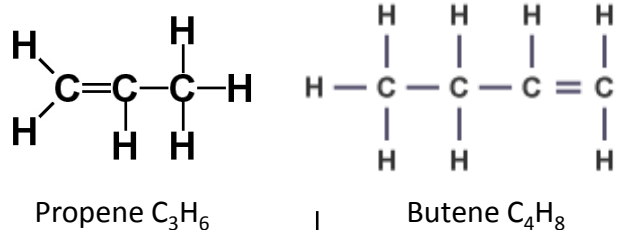
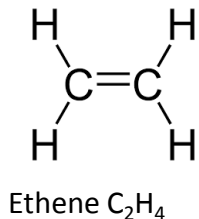


**Combustion**  
During the complete combustion of hydrocarbons, the carbon and hydrogen in the fuels are oxidised, releasing carbon dioxide, water and energy.

Complete combustion of methane:  
Methane + oxygen → carbon dioxide + water + energy  
 $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$



<b>Testing for alkenes</b>	<i>Alkenes are more reactive than alkanes and react with bromine water. Bromine water changes from orange to colourless in the presence of alkenes.</i>
<b>Addition reaction</b>	<i>The double bond within the alkene breaks and a bromine atom bonds to each carbon with a single bond.</i>



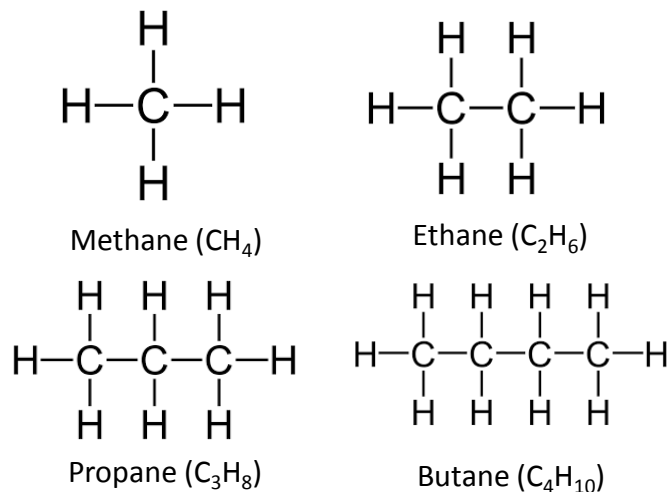
<b>Alkanes to alkenes</b>	<i>Long chain alkanes are cracked into short chain alkenes.</i>
<b>Alkenes</b>	<i>Alkenes are hydrocarbons with a double bond (some are formed during the cracking process).</i>
<b>General formula</b>	$\text{C}_n\text{H}_{2n}$ <i>For example: <math>\text{C}_3\text{H}_6</math></i>

**EDEXCEL TOPIC 9: Separate Chemistry 2 (1)**

**Hydrocarbons**

**Alkanes**

<b>Hydrocarbons</b>	<i>These make up the majority of the compounds in crude oil</i>	Most of these hydrocarbons are called alkanes.
<b>Alkanes</b>	<i>General formula: <math>\text{C}_n\text{H}_{2n+2}</math></i> <i>For example: <math>\text{C}_2\text{H}_6</math></i>	Alkanes are saturated as the compounds have single bonds between the atoms.



Element	Colour flames
Lithium	Red
Sodium	Yellow
Potassium	Lilac
Calcium	Orange-red
Copper	Blue-green

**Flame tests**

**Sodium hydroxide test**

<b>Sodium hydroxide</b>	<i>Is added to solutions to identify metal ions.</i>
<b>White precipitates</b>	<i>Aluminium, calcium and magnesium ions form this with sodium hydroxide solution.</i>
<b>Coloured precipitates</b>	<i>Copper (II) = blue-green Iron (II) = green Iron (III) = brown</i>

**Carbonates, halides and sulfates**

<b>Carbonates</b>	<i>React with dilute acids to form carbon dioxide.</i>
<b>Halide ions</b>	<i>When in a solution, they produce precipitates with silver nitrate solution in the presence of nitric acid.</i>
<b>Sulfate ions</b>	<i>When in a solution they produce a white precipitate with barium chloride solutions in the presence of hydrochloric acid.</i>

**Qualitative analysis: tests for ions**

<b>Testing for ammonia</b>	<i>Damp red litmus paper</i>	Will turn blue in the presence of ammonia. Can also be identified by its characteristic smell.
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<b>Instrumental methods</b>	<i>Methods that rely on machines</i>	Can be used to identify elements and compounds. These methods are accurate, sensitive and rapid.
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<b>Flame photometry</b>	<i>An instrumental method used to analyse metal ions</i>	Analyses the concentration of ions in a dilute solution using a calibration curve. The user compares the results to known data in order to identify the metal ions and their concentration.
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