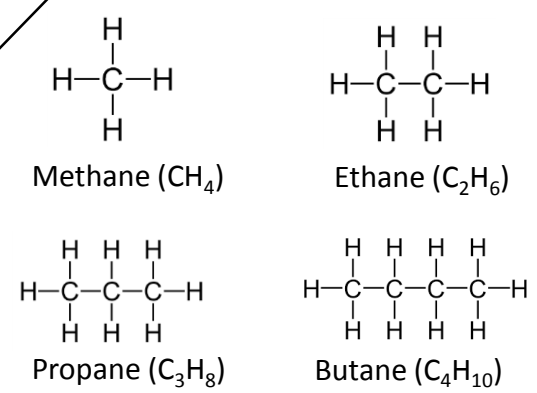


Crude oil, hydrocarbons and alkanes

Display formula for first four alkanes



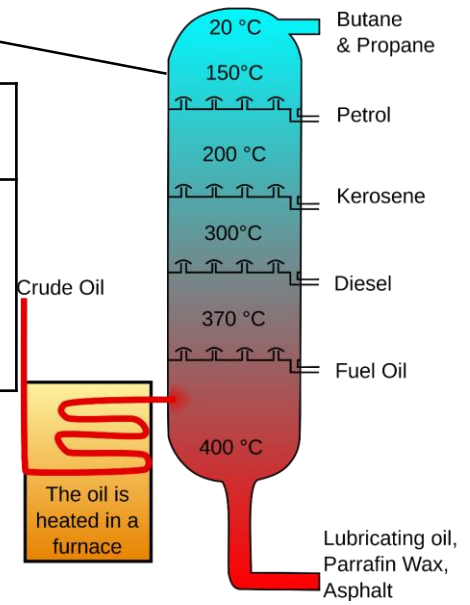
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| Fractions | <i>The hydrocarbons in crude oil can be split into fractions</i> | Each fraction contains molecules with a similar number of carbon atoms in them. The process used to do this is called fractional distillation. |
| Using fractions | <i>Fractions can be processed to produce fuels and feedstock for petrochemical industry</i> | We depend on many of these fuels; petrol, diesel and kerosene. Many useful materials are made by the petrochemical industry; solvents, lubricants and polymers. |

Carbon compounds as fuels and feedstock

EDEXCEL TOPIC 8: Fuels and Earth Science

Fractional distillation and petrochemicals

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| Hydrocarbon chains | In oil | Hydrocarbon chains in crude oil come in lots of different lengths. |
| | Boiling points | The boiling point of the chain depends on its length. During fractional distillation, they boil and separate at different temperatures due to this. |



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| Crude oil | <i>A finite resource</i> | Consisting mainly of plankton that was buried in the mud, crude oil is the remains of ancient biomass. |
| Hydrocarbons | <i>These make up the majority of the compounds in crude oil</i> | These compounds are made up of hydrogen and carbon only. |
| General formula for alkanes | C_nH_{2n+2} | For example: C_2H_6 C_6H_{14} |

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| Cracking | <i>The breaking down of long chain hydrocarbons into smaller, more useful chains</i> | The smaller chains are more useful. Cracking can be done by various methods including catalytic cracking and steam cracking. |
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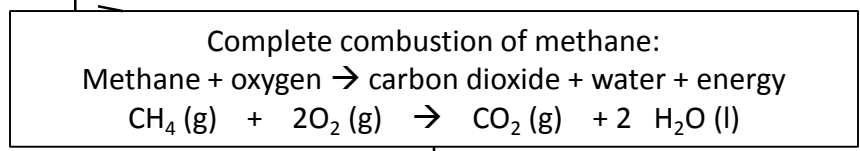
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| Sulfur dioxide | <i>Released from burning hydrocarbons with sulfur impurities in</i> | Sulfur dioxide dissolves in rain water to form acid rain. This damages plant life and can make water habitats acidic. Acid rain can also erode limestone and sandstone structures. |
| Oxides of nitrogen | <i>Oxygen and nitrogen react under high temperatures to form these</i> | As pollutants, oxides of nitrogen can damage the ozone layer and are also classified as greenhouse gases. Can cause respiratory problems. |

Fuels

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| Hydrogen fuel | <i>Hydrogen reacts with oxygen in the engine to power the vehicle</i> | <p>Advantages:</p> <ul style="list-style-type: none"> - Water is the product - No greenhouse gases released - Renewable <p>Disadvantages:</p> <ul style="list-style-type: none"> - Expensive to buy - Difficult to re-fuel |
| Fossil fuels | <i>Crude oil, natural gas and coal</i> | Petrol, kerosene and diesel oil are non-renewable. Methane is found in natural gas and is also non-renewable. |

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| Incomplete combustion issues | <i>Carbon monoxide is an odourless, toxic gas that can kill</i> | Soot (carbon) is also produced that builds up in the atmosphere and can cause global dimming. This reduces the amount of sunlight that reaches the Earth and can alter rainfall patterns. |
|-------------------------------------|---|---|

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| Combustion | During the complete combustion of hydrocarbons, the carbon and hydrogen in the fuels are oxidised, releasing carbon dioxide, water and energy. |
| Incomplete combustion | During the incomplete combustion of hydrocarbons, there is not enough oxygen available for complete combustion. The products of the reaction is carbon monoxide, carbon and water. |



| | |
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| Boiling point (temperature at which liquid boils) | <i>As the hydrocarbon chain length increases, boiling point increases.</i> |
| Viscosity (how easily it flows) | <i>As the hydrocarbon chain length increases, viscosity increases.</i> |
| Flammability (how easily it burns) | <i>As the hydrocarbon chain length increases, flammability decreases.</i> |