

**Science: GCSE Organic Chemistry**

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| 1. Key Words | |
| Hydrocarbon | Compound made up of only carbon and hydrogen atoms |
| Alkane | Saturated hydrocarbon containing only single bonds between the atoms |
| Alkene | Unsaturated hydrocarbon containing at least one double bond |
| Cracking | A process that uses high temperatures and a catalyst to break down long chain alkanes into smaller alkanes and alkenes making more useful products |
| Fractional Distillation | A process of separating the different chain lengths of hydrocarbons found in crude oil |
| Crude oil | Fossil fuel made from the remains of dead plants and sea creatures millions of years ago and contains a millions of years ago, containing a mixture of different hydrocarbons |

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| 1. Properties of Hydrocarbons | |
| Viscosity | This refers to the thickness of the liquid hydrocarbon. As the length of the hydrocarbon chain increases, the viscosity increases and the liquid compound becomes thicker |
| Boiling point | This refers to the temperature at which the liquid hydrocarbon changes into a gas. The longer the hydrocarbon chain, the higher the boiling point |
| Flammable | This refers to how easily the hydrocarbon sets on fire. The smaller the hydrocarbon chain the more flammable it is |

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| Challenge Questions | |
| 1 | How is crude oil formed? |
| 2 | Why would hexane be an unsuitable fuel for cars? |
| 3 | How could you investigate the effects of temperature on the viscosity of a hydrocarbon? |
| 4 | Research some uses of simple alkenes (ethane to hexane) |

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| 1. Alkanes | | | |
| General Formula | | CnH2n+2 | |
| Alkane name | Alkane formula | | Alkane structure |
| Methane | CH4 | |  |
| Ethane | C2H6 | |  |
| Propane | C3H8 | |  |
| Butane | C4H10 | |  |
| Pentane | C5H12 | |  |
| Hexane | C6H14 | |  |



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| 1. Fractional Distillation | | |
| 1. In a furnace, crude oil is heated until it boils. 2. The vapour then passes into the fractionating column which cools as it moves up the column. 3. Those hydrocarbons with the highest boiling points condense first and are extracted. 4. This continues up the column | | |
|  | Fraction and chain length | Use |
| 1 | Fuel gas (C 1 – 4) | In camper stoves and gas bottles |
| 2 | Petrol (C 5 – 10) | Used as fuel in cars |
| 3 | Kerosene (C 10 – 16) | Used a fuel for aeroplanes |
| 4 | Diesel (C 14 – 20) | Used as fuel for cars and lorries |
| 5 | Lubricating oil (C 20 – 50) | Used in making oils, waxes and polishes |
| 6 | Bitumen (C 70+) | Used to tar roads and felt roofs |
| 6  5  4  3  2  1 | | |

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| 1. Alkenes and Cracking | |
| Formula of alkenes | CnH2n |
| Alkanes contain a double bond between one of the carbon –carbon bonds  e.g. propene | |
| Cracking: Most hydrocarbons produce products with limited or no use. Cracking allows the large chain hydrocarbons to be broken down into useful products. | |
| Conditions needed for cracking | Temperatures between 450 - 700˚C  A catalyst called zeolite which contains aluminium oxide and silicon oxide |
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| Testing for the presence of alkenes | Adding bromine water to the sample. If the sample turns colourless, then the sample is an alkene. |