Science: Organic Chemistry

1. Key Words

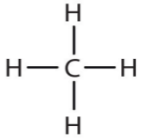
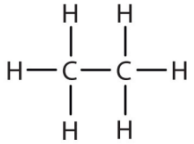
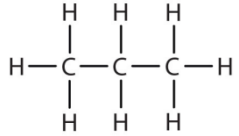
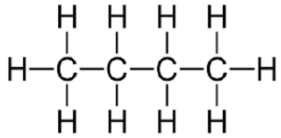
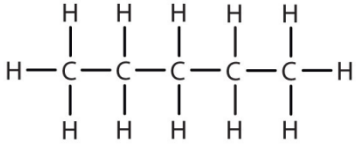
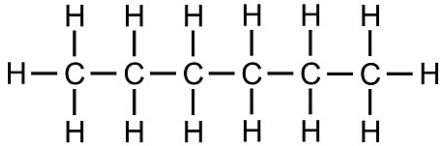
Hydrocarbon	Compound made up of only carbon and hydrogen atoms
Alkane	Saturated hydrocarbon containing only single bonds between the atoms
Alkene	Unsaturated hydrocarbon containing at least one double bond
Cracking	A process that uses high temperatures and a catalyst to break down long chain alkanes 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

2. 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

3. Alkanes

General Formula	C_nH_{2n+2}

Alkane name	Alkane formula	Alkane structure
Methane	CH_4	
Ethane	C_2H_6	
Propane	C_3H_8	
Butane	C_4H_{10}	
Pentane	C_5H_{12}	
Hexane	C_6H_{14}	

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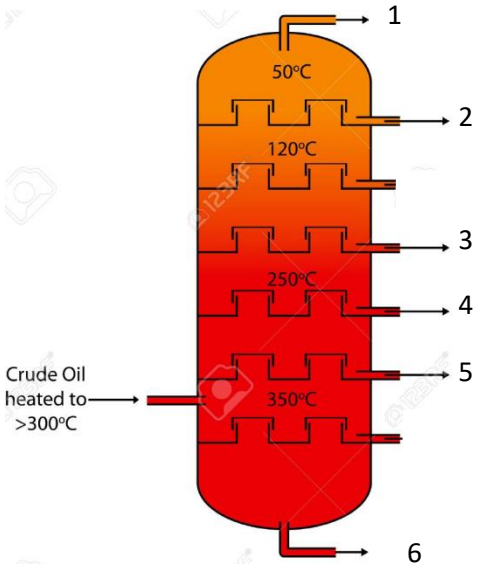
4. Fractional Distillation

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

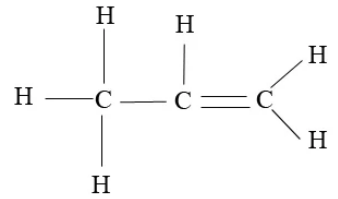
	Fraction and chain length	Use
1	Fuel gas (C 1 – 4)	In camper stoves and gas bottles
2	Petrol (C 5 – 10)	Used as fuel in cars
3	Kerosene (C 10 – 16)	Used a fuel for aeroplanes
4	Diesel (C 14 – 20)	Used as fuel for cars and lorries
5	Lubricating oil (C 20 – 50)	Used in making oils, waxes and polishes
6	Bitumen (C 70+)	Used to tar roads and felt roofs



5. Alkenes and Cracking

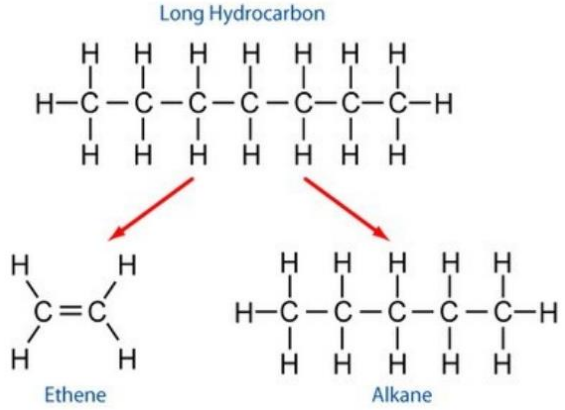
Formula of alkenes	C_nH_{2n}

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



Testing for the presence of alkenes	Adding bromine water to the sample. If the sample turns colourless, then the sample is an alkene.