

100% sheet

Year 11
Organic chemistry
Combined science



PiXL				play formula for first four alkanes						Each fraction contains		PiXL scien		
Partners in excellence Crude oil	A finite resource	Consisting n plankton the in the mud, the remains	at was buried crude oil is	oil,	H —C—H H thane (CH₄)	H H		Fractions		The hydrocarbons in crude oil can be split into fractions		molecules with a similar number of carbon atoms in them. The process used to do this is called fractional distillation.		
Hydrocarbons	These make up the majority of the compounds in crude oil	Most of these hydrocarbons are called alkanes.		H-C	C—C—H H H pane (C ₃ H ₈)	H H H H H-C-C-C-C-C-C- H H H H Butane (C ₄ H ₁₀)	Usi fract		Fractions can be processed to produce fuels and feedstock for petrochemical industry	the and Ma ma	depend on ma se fuels; petrol d kerosene. ny useful mate de by the petro ustry; solvents,	rials are chemical	
		For example	2:	Carbon compounds as fuels and feedstock						ı	and polymers.			
General formula for alkanes	C_nH_{2n+2}		C ₂ H ₆		AQA G	CSE			listillation and themicals			20 °C	Butane & Propane	
				Or	ganic che	•		io Hy	ydroca	Trbon chains in crude	oil com	e	150°C	Petrol
Alkanes to alkenes Long chain alkanes are cracked into short chain alkenes.			Carbon compounds			4	in The	lots of different lengths.			200°C ፲፫፲፫፲፫፫ 300°C	Kerosene		
Alkenes are hydrocarbons with a double bond (some are formed during the cracking process).			as fuels and feedstock			The boiling point of the chain depends on its length. During fractional distillation, they boil and separate at different temperatures due to this.			Crude Oil	370 °C	Diesel Fuel Oil			
Properties of alkenes are more reactive that alkanes and react with bromine water. Bromine water changes from orange to colourless in the presence of alkenes.			Cracking and alkenes			During the complete combustion of hydrocarbons, the carbon and hydrogen in the fuels are oxidised, releasing carbon			The oil is heated in a furnace		Lubricating oil, Parrafin Wax, Asphalt			
	The breaking o	town of I	ne smaller chains						dioxide	Complete combustion of methane: Methane + oxygen \rightarrow carbon dioxide + water + ener CH_4 (g) + $2O_2$ (g) \rightarrow CO_2 (g) + 2 H_2O (I)			Дэрпан	
Cracking	long cha hydrocarbon smaller ch	va es into cai	eful. Cracking car rious methods in talytic cracking an acking.	cluding		entane + propene $C_5H_{12} + C_3H_6$			<u> </u>					
Catalytic cracking	ng The heavy fraction is heated until yapparised After vaporisation passed over a horizontal forming smaller,		ter vaporisation, assed over a hot comming smaller, moderocarbons.	atalyst	alyst and uses		Used to produce po They are also used starting materials other chemicals, s alcohol, plastics		of many such as Boiling point (temperature which liquid bo		at	As the hydrocarbon chain lengt increases, boiling point increase		_
					, ,	detergents		•		Viscosity (how easily it flows)		As the hydrocarbon chain length increases, viscosity increases.		_
Steam cracking	The heavy fraction is heated until vaporised After vaporisation, the mixed with steam and a very high temperate smaller, more useful hydrocarbons.		and heated to	Why do we crack long chains?	Without cracking, m long hydrocarbons wasted as there is a demand for these of shorter chair		would be not much as for the (how eas		Flammability (how easily it bu		As the hydrocarbon chain len		n length	

Display formula for first four alkanes

PiXL Partners in excellence	Crud	play formula for	r first four alkanes H H		The hydrocarbons in	Each fraction contains molecules with a similar	PixLscience	
A finite resource	Consisting mainly of plankton that was buried in the mud, crude oil is the remains of ancient	e oil, h	I—C⊤H H ethane (CH₄)	$H - \overset{\mid}{C} - \overset{\mid}{C} - H$ $H H$ Ethane (C_2H_6)		crude oil can be split into fractions	number of carbon atoms in them. The process used to do this is called fractional distillation.	
These make up the majority of the compounds in crude oil	hydrocarbons are called alkanes.	rbons H—C		H H H H H-C-C-C-C-H H H H H Butane (C ₄ H ₁₀)		Fractions can be processed to produce fuels and feedstock for petrochemical industry	We depend on many of these fuels; petrol, diesel and kerosene. Many useful materials are made by the petrochemical industry; solvents, lubricants and polymers.	
<i>C_nH_{2n+2}</i>	For example: C ₂ H ₆		and feeds			listillation and	and polymers.	Butane
	C ₆ H ₁₄			AQA GCSE		hemicals	20 °C 150°C	& Propane
Long chain alkan	Organic chemistry 1 Carbon compounds			1 '	Hydrocarbon chains in crude oil come in lots of different lengths.			
Alkenes are hydbond (some d	Alkenes are hydrocarbons with a double bond (some are formed during the cracking process).			and	der fractio	e boiling point of the chain bends on its length. Durin onal distillation, they boil ate at different temperat due to this.	and Crude Oil 370 °C 370 °C	Trefosence
and react with l water changes f	re reactive that alkanes promine water. Bromine rom orange to colourless sence of alkenes.	Cracking a	and alkenes	Properti	hydrocarbons the fuels are	complete combustion o , the carbon and hydroge coxidised, releasing carbo	en in heated in a furnace	Lubricating oil, Parrafin Wax, Asphalt
The breaking long of hydrocark smaller	various methods in	n be done by ncluding		entane + propene + C_5H_{12} + C_3H_6 +	ethane	Complete combustion of methane: Methane + oxygen \rightarrow carbon dioxide + water + energy $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2 H_2O(I)$		
The heavy heated vapor	After vaporisation, passed over a hot of forming smaller, more	After vaporisation, the vapour is passed over a hot catalyst forming smaller, more useful		Used to produce polymers. They are also used as the starting materials of many other chemicals, such as			As the hydrocarbon chain increases, boiling point in	_
	After vaporisation,	hydrocarbons. After vaporisation, the vapour is		alcohol, plastics and detergents. Without cracking, many of t			As the hydrocarbon chain increases, viscosity incre	_
The heavy heated vapor	a very high tempera	a very high temperature forming smaller, more useful		long hydrocarbo wasted as there demand for thes shorter ch	ns would be is not much se as for the		As the hydrocarbon chain increases, flammability de	_
			better hope – l	brighter future				

PiXI			play formula fo	first four alkanes		T	Each fraction contains	PIXL Science
Partners in excellence Crude oil	Consisting mainly of plankton that was buried in the mud, crude oil is the remains of ancient	oil, h	H −C−H H thane (CH₄)	H H H-C-C-H H H H Ethane (C ₂ H ₆)	Fractions		molecules with a similar number of carbon atoms in them. The process used to do this is called fractional distillation.	Science
Hydrocarbons	Most of these hydrocarbons are called alkanes.	rbons H-C	H H C-C-C-H I H H pane (C ₃ H ₈)	H H H H H-C-C-C-C-H H H H H Butane (C ₄ H ₁₀)	Using fractions		We depend on many of these fuels; petrol, diesel and kerosene. Many useful materials are made by the petrochemical industry; solvents, lubricants	
General formula for alkanes	For example: C ₂ H ₆	and feedstock			Fractional d	istillation and	and polymers.]
	C ₆ H ₁₄		AQA GO			hemicals	20 °C	Butane & Propane
Alkanes to alkenes		Carbon compounds as fuels and feedstock Weight Street Transport T			In oil		150°C	Petrol Kerosene
Alkenes			as fuels feedsto	hydrocark Hydrocark	Boiling points		370 °C	Diesel Fuel Oil
Properties of alkenes		Cracking a	nd alkenes	Propertie	es of hydroca	rbons	Turridee	Lubricating oil, Parrafin Wax,
Cracking	are more n be done by cluding nd steam $C_{10}H_{22} \rightarrow C_{5}H_{12} + C_{3}H_{6} + C_{10}H_{12}$				Complete combustion of methane: Methane + oxygen \rightarrow carbon dioxide + water + energy CH_4 (g) + $2O_2$ (g) \rightarrow CO_2 (g) + 2 H_2O (I)			
Catalytic cracking	After vaporisation, the passed over a hot cat forming smaller, more hydrocarbons.	Alkenes and uses as polymers			Boiling point (temperature at which liquid boils)			
Steam cracking	After vaporisation, the mixed with steam are a very high temperate smaller, more useful hydrocarbons.	Why do we crack long chains?			Viscosity (how easily it flows) Flammability (how easily it burns)			
			better hope – I	orighter future				

