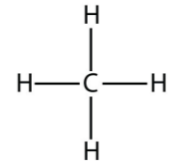
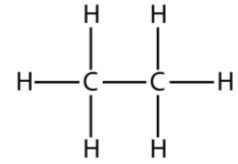
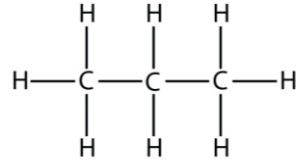
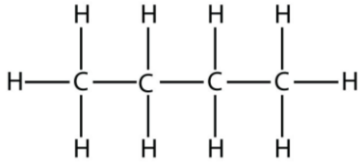
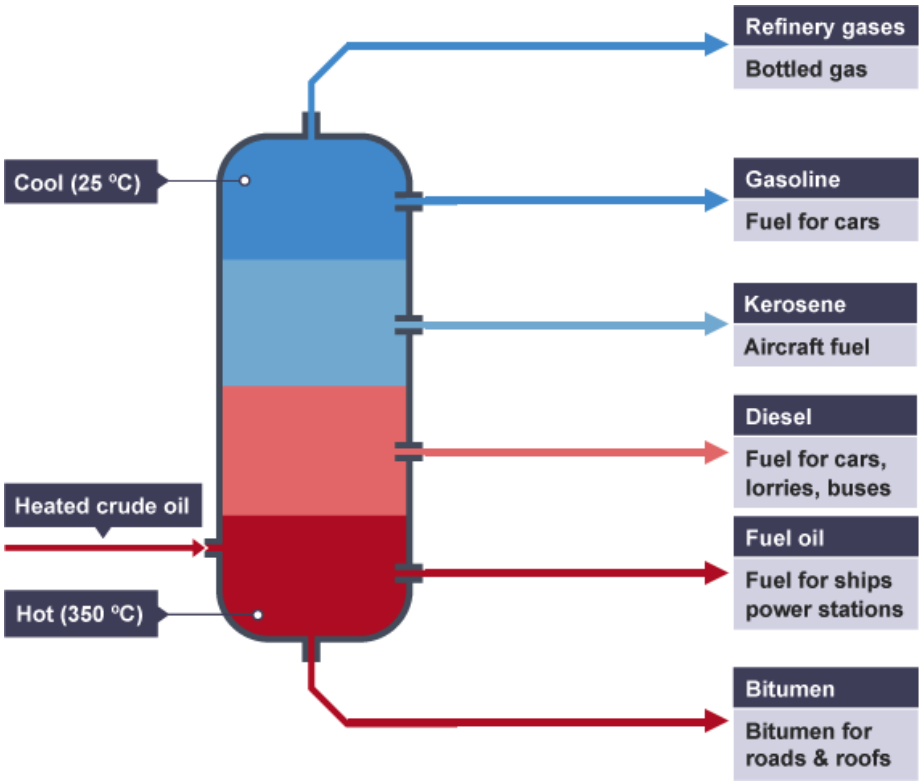
Chemistry Topic 7: Organic chemistry

1. Carbon compounds as fuels and feedstock	
Hydrocarbon	A chemical made of only carbon and hydrogen
Crude oil	A mixture of hydrocarbons found in rock
Alkanes	Saturated hydrocarbons (without double bond)
Alkene	Unsaturated hydrocarbon (with double bond). They turn bromine water from brown to colourless.
Fractional distillation	A process of separating crude oil using the different boiling points of fractions
Viscosity	How thick a liquid is
Flammability	How easily a fraction catches fire
Boiling point	The temperature at which a substance turns from a liquid to a gas
Combustion	A reaction where a fuel is oxidised releasing heat energy
Cracking	Breaking less useful long-chain alkanes into useful short-chain alkanes and alkenes

2. Alkanes		
General formula	C_nH_{2n+2}	
Name	Molecular formula	Displayed formula
Methane	CH_4	
Ethane	C_2H_6	
Propane	C_3H_8	
Butane	C_4H_{10}	

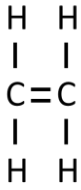
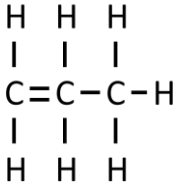
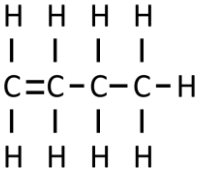
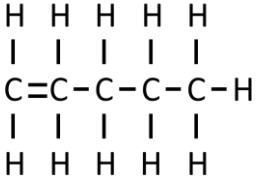
3. Fractional distillation	
1.	The column is cooler at the top than the bottom
2.	The crude oil is heated
3	The fractions evaporate and rise up the column
4	The fractions condense at different points according to their boiling point
5	The liquid fractions run off and are collected



4. Properties of hydrocarbons	
Property	Change as carbon change gets longer
Boiling point	Increases
Viscosity	Increases (less runny)
Flammability	Decreases

5. Cracking	
Type of cracking	Conditions
Catalytic	Hot (500°C) + catalyst
Steam	Very hot (850°C) + Steam
Short chain = desirable	Long chain = undesirable

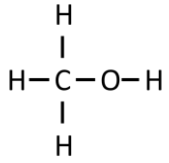
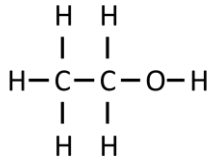
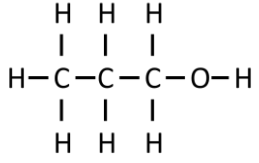
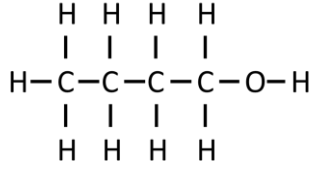
6. Alkenes (TRIPLE ONLY)

General formula	C_nH_{2n}	
Name	Molecular formula	Displayed formula
Ethene	C_2H_4	
Propene	C_3H_6	
Butene	C_4H_8	
Pentene	C_5H_{10}	

7. Reactions of Alkenes (TRIPLE ONLY)

Reaction	Observation
Oxidation (incomplete combustion)	Burn in air to produce smoky flames
Addition	Double bond opens to form single bonds. Reacts with hydrogen, water and halogens

6. Alcohols (TRIPLE ONLY)

Functional group	-OH	
Name	Molecular formula	Displayed formula
Methanol	CH_3OH	
Ethanol	C_2H_5OH	
Propanol	C_3H_7OH	
Butanol	C_4H_9OH	

7. Fermentation of alcohols (TRIPLE ONLY)

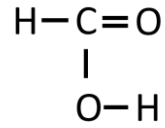
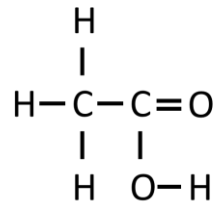
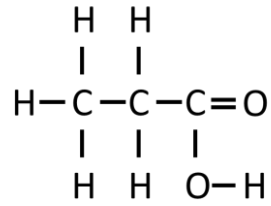
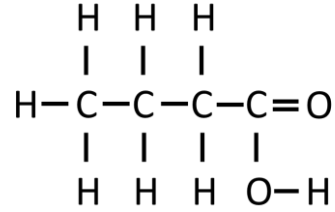
glucose $\xrightarrow{yeast}$ ethanol + carbon dioxide

$C_6H_{12}O_{6(aq)} \xrightarrow{yeast} 2C_2H_5OH_{(aq)} + 2CO_{2(aq)}$

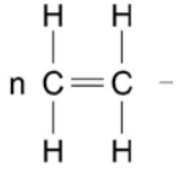
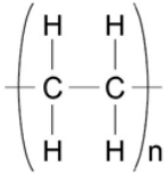
8. Reactions of alcohol (TRIPLE ONLY)

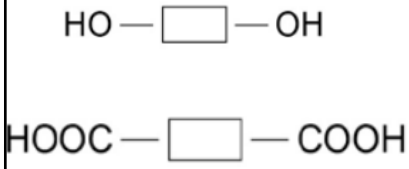
Reaction	Observation	Uses
Combustion	Burns with a clean flame	Spirit burners, biofuels
With Sodium	Hydrogen bubbles given off. Metal skates around surface	N/A
Oxidation	Oxidising agent changes colour	Making carboxylic acids

9. Carboxylic acids (TRIPLE ONLY)

Functional group	-COOH	
Name	Molecular formula	Displayed formula
Methanoic acid	HCOOH	
Ethanoic acid	CH_3COOH	
Propanoic acid	C_2H_5COOH	
Butanoic acid	C_3H_7COOH	

10. Synthetic and naturally occurring polymers (TRIPLE ONLY)	
Monomer	A small unit that joins together to make a polymer
Polymer	A long chain molecule made of many polymers
Synthetic	Man made
DNA	Deoxyribosenucleic acid. Natural polymer that codes genetic instructions. Formed of nucleotides in a double helix
Cellulose	Natural polymer made from glucose. Use in plant cell walls
Starch	Natural polymer made from glucose. Use in plant cells as a food store
Protein	Natural polymer made of amino acids. Used for growth and repair in cells. Also called a polypeptide.

11. Addition polymerisation (TRIPLE ONLY)	
Monomer(s)	Polymer
Alkenes	Long-chain alkane
 ethene	 poly(ethene)

11. Condensation polymerisation (TRIPLE HT ONLY)	
Monomer(s)	Polymer
Diol (2 alcohol) Dicarboxylic acid	Polyester (+ water)
	

12. Amino acids (TRIPLE HT ONLY)	
Monomer(s)	Polymer
Amino acid	Polypeptide (+ water)