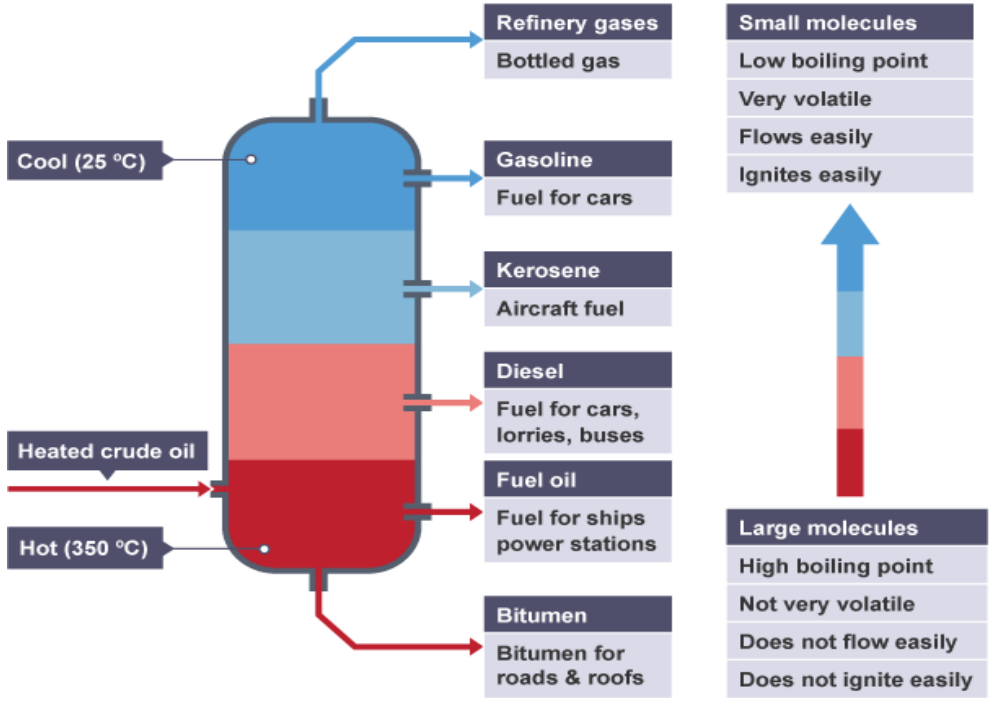
Chemistry 7: Organic Chemistry

Section 1:

1 Hydrocarbon	A molecule consisting of hydrogen and carbon **only**
2 Complete combustion	Molecule burns completely in oxygen to produce **carbon dioxide** and **water**
3 Incomplete combustion	Molecules don't get enough oxygen so produces carbon monoxide, carbon and water after burning with a smoky yellow flame and less energy than complete .

Section 2: Fractional distillation

Crude oil	**Fossil fuel made from plant and animal remains, drilled up.**
Fractional distillation	**Process of separating crude oil by boiling point.**



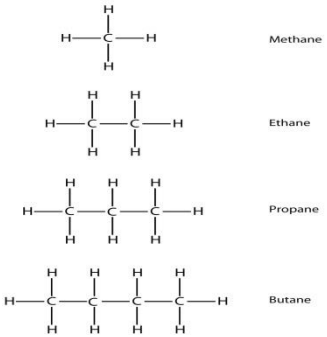
Section 3: Cracking

Cracking	Breaking larger alkanes to produce smaller more useful alkanes + an alkene. Through thermal decomposition.
Homologous series	A series of compounds that have similar chemical properties and the same general formula
Catalytic cracking	Vaporise the hydrocarbon, pass over an aluminium oxide catalyst
Steam cracking	Vaporise the hydrocarbon, mix with steam and heat to high temperatures

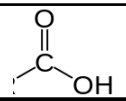
Section 4: Naming compounds

Number of carbons	Prefix	example
1	**meth**	**methane**
2	**eth**	**ethane**
3	**prop**	**propane**
4	**but**	**butane**

Section 5: Naming alkanes



Section 6: Functional groups

	Saturatation	Functional group	General formula	suffix
Alkane	**Saturated**	**Saturated hydrocarbon**	**CnH2n+2**	**ane**
Alkene	**Unsaturated**	**C=C**	**CnH2n**	**ene**
Alcohol	**X**	**OH**	**CnH2n+1OH**	**ol**
Carboxylic acid	**X**		**CnH2n+1COOH**	**Oic acid**

Section 7 : Properties of alcohols

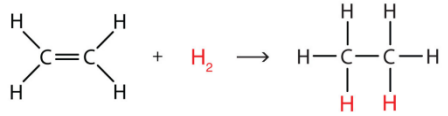
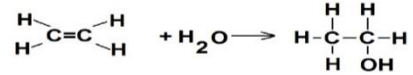
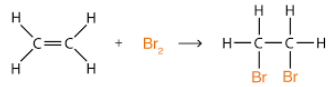
Flammable	**Undergo complete combustion to form carbon dioxide and water.**
Solubility	First four alcohols are soluble in water with neutral pH.
React with Na	Produces sodium hydroxide and hydrogen
Can be oxidised	React with oxygen to produce carboxylic acids. E.g. ethanol → ethanoic acid

Section 7a Uses of alcohol

Solvents	Can dissolve things water can't like fats and oils
Fuels	Burnt in spirit burners fairly cleanly and non-smelly

Section 7b Making alcohol	Equation	Catalyst	Conditions
Fermentation	Sugar → ethanol + carbon dioxide $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$	Yeast	37°C, slightly acidic and with no oxygen (anaerobic respiration). Too hot enzyme denatures. Too cold reaction too slow.

Section 8: Reactions of alkenes

Name	Conditions	Example
Hydrogenation	**React with hydrogen and a catalyst.**	
Making alcohol	**React with steam and a catalyst. The product is then condensed and purified by fractional distillation.**	
Halogenation	React with halogens to form dihalocompounds. E.g dibromoethane	

Section 9: Test for saturation	Alkane	Alkene
Add bromine water	**Solution stays orange-brown**	**Solution turns from orange-brown to colourless**

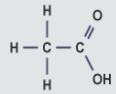
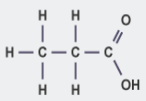
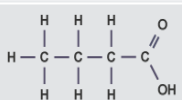
Section 10a: carboxylic acids

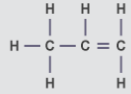
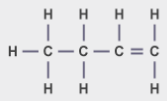
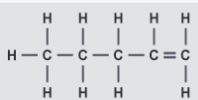
Acid Strength	Weak acids because they only partially ionise in water.

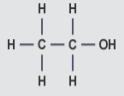
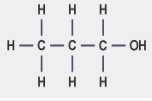
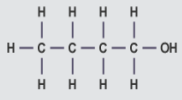
Section 10b Reactions

Reaction with bases	Ethanoic acid + sodium carbonate → Sodium ethanoate + water + carbon dioxide
Formation of esters	Alcohol + Carboxylic acid → ester + water Eg. ethanol+ ethanoic acid → Ethyl ethanoate + water

Section 11: Naming organic molecules

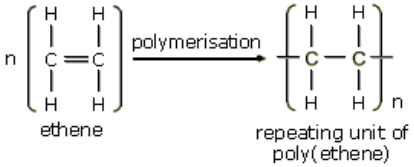
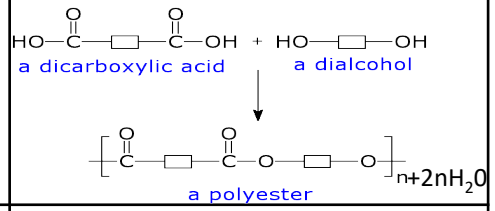
Name	Molecular formula	Full structural formula
Methanoic acid	HCOOH	
Ethanoic acid	CH_3COOH	
Propanoic acid	C_2H_5COOH	
Butanoic acid	C_3H_7COOH	

Name	Molecular formula	Full structural formula
Ethene	C_2H_4	
Propene	C_3H_6	
Butene	C_4H_8	
Pentene	C_5H_{10}	

Name	Molecular formula	Full structural formula
Methanol	CH_3OH	
Ethanol	C_2H_5OH	
Propan-1-ol	C_3H_7OH	
Butan-1-ol	C_4H_9OH	

Section 12: Polymers

Monomer	Small molecules that react together to form a polymer
Polymer	**A large molecule formed from lots of different monomers bonding together. Usually needs high pressure and a catalyst.**
Repeating unit	**The part of the polymer that repeats itself.**

Section 12a Types of polymerisation	Addition Polymerisation	Condensation polymerisation
Example		
Number of types of monomers	Only 1 monomer containing C=C	Two monomer types each containing two of the same functional group. Or One monomer with two different functional groups.
Number of products	1	2 – the polymer and water
Functional groups involved in polymerisation	C=C	Two reactive groups on each monomer

Section 13: Naturally occuring polymers

Amino Acid	A monomer for proteins – contains two different functional groups.
Protein	**Polymers of amino acids. Structure determined by the order of amino acids.**
Base	**A,T,C,G. Pair together on a different polymer change to make the double helix structure**
Nucleotides	**A polymer chain. Two of these combine to make the double helix of DNA**
Sugars	**Large carbohydrate polymers e.g cellulose**