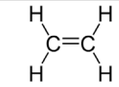
100% sheet

Year 11
Organic chemistry
Separate science

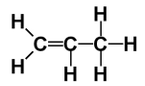
AQA GCSE Organic chemistry 2 (CHEMISTRY ONLY)

Structure and formula of alkenes

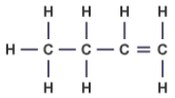
Alkenes	***Hydrocarbons with a double carbon-carbon bond.***
Unsaturated	***Alkenes are unsaturated because they contain two fewer hydrogen atoms than their alkane counterparts.***
General formula for alkenes	***C_nH_{2n}***



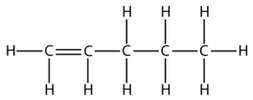
Ethene C_2H_4



Propene C_3H_6



Butene C_4H_8

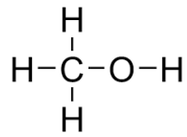


Pentene C_5H_{10}

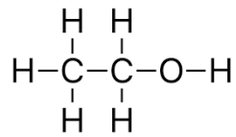
Reactions of alkenes

Functional group	***Alkenes are hydrocarbons in the functional group C=C.***	The functional group of an organic compound determined their reactions.
Alkene reactions	***Alkenes react with oxygen in the same way as other hydrocarbons, just with a smoky flame due to incomplete combustion.***	Alkenes also react with hydrogen, water and the halogens. The C=C bond allows for the addition of other atoms.

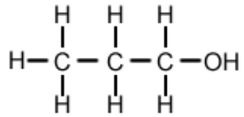
Alcohols



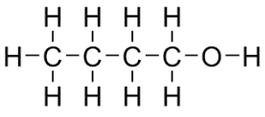
Methanol



Ethanol



Propanol



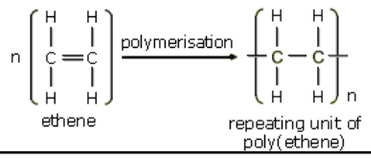
Butanol

Functional group	***-OH*** ***For example: CH_3CH_2OH***	Methanol, ethanol, propanol and butanol are the first four of the homologous series.
Alcohol reactions	***Alcohols react with sodium, air and water.***	Alcohols and sodium: bubbling, hydrogen gas given off and salt formed. Alcohols and air: alcohols burn in air releasing carbon dioxide and water. Alcohols and water: alcohols dissolve in water to form a neutral solution.
Fermentation	***Ethanol is produced from fermentation.***	When sugar solutions are fermented using yeast, aqueous solutions of ethanol are produced. The conditions needed for this process include a moderate temperature (25 – 50°C), water (from sugar solution) and an absence of oxygen.

Carboxylic acids

Functional group	***-COOH*** ***For example: CH_3COOH***	Methanoic acid, ethanoic acid, propanoic acid and butanoic acid are the first four of the homologous series.
Carboxylic acid reactions	***Carboxylic acids react with carbonates, water and alcohols.***	Carboxylic acids and carbonates: These acids are neutralised by carbonates Carboxylic acids and water: These acids dissolve in water. Carboxylic acids and alcohols: The acids react with alcohols to form esters.
Strength (HT only)	***Carboxylic acids are weak acids***	Carboxylic acids only partially ionise in water. An aqueous solution of a weak acid with have a high pH (but still below 7).

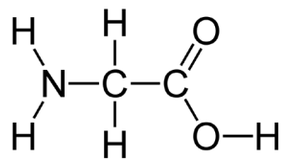
Addition polymerisation

Polymers	***Alkenes are used to make polymers by addition polymerisation.***	Many small molecules join together to form polymers (very large molecules).
Displaying polymers	***In addition polymers, the repeating unit has the same atoms as the monomer.***	It can be displayed like this:  ethene polymerisation repeating unit of poly(ethene)

Condensation polymerisation (HT only)

Amino acids

Amino acids have two functional groups in a molecule. They react by condensation polymerisation to produce peptides.



Glycine

Condensation polymerisation	***Condensation polymerisation involves monomers with two functional groups***	When these types of monomers react they join together and usually lose small molecules, such as water. This is why they are called condensation reactions.

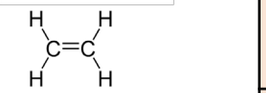
DNA and naturally occurring polymers

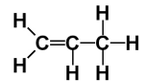
DNA	***Deoxyribonucleic acid is a large molecule essential for life. DNA gives the genetic instructions to ensure development and functioning of living organisms and viruses.***
DNA structure	***Most DNA molecules are two polymer chains made from four different monomers, called nucleotides. They are in the double helix formation.***
Natural polymers	***Other naturally occurring polymers include proteins, starch and cellulose and are all important for life.***

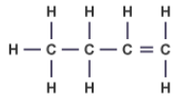
AQA GCSE Organic chemistry 2 (CHEMISTRY ONLY)

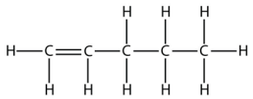
Structure and formula of alkenes

	Hydrocarbons with a double carbon-carbon bond.
	Alkenes are unsaturated because they contain two fewer hydrogen atoms than their alkane counterparts.
	C_nH_{2n}


Ethene C_2H_4


Propene C_3H_6

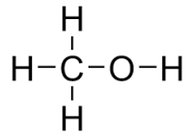

Butene C_4H_8

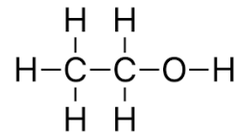

Pentene C_5H_{10}

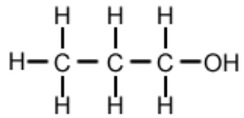
Reactions of alkenes

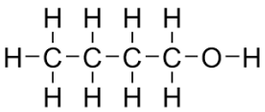
	Alkenes are hydrocarbons in the functional group C=C.	The functional group of an organic compound determined their reactions.
	Alkenes react with oxygen in the same way as other hydrocarbons, just with a smoky flame due to incomplete combustion.	Alkenes also react with hydrogen, water and the halogens. The C=C bond allows for the addition of other atoms.

Alcohols


Methanol


Ethanol


Propanol

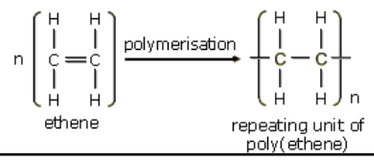

Butanol

	-OH *For example: CH_3CH_2OH*	Methanol, ethanol, propanol and butanol are the first four of the homologous series.
	Alcohols react with sodium, air and water.	Alcohols and sodium: bubbling, hydrogen gas given off and salt formed. Alcohols and air: alcohols burn in air releasing carbon dioxide and water. Alcohols and water: alcohols dissolve in water to form a neutral solution.
	Ethanol is produced from fermentation.	When sugar solutions are fermented using yeast, aqueous solutions of ethanol are produced. The conditions needed for this process include a moderate temperature (25 – 50°C), water (from sugar solution) and an absence of oxygen.

Carboxylic acids

	-COOH *For example: CH_3COOH*	Methanoic acid, ethanoic acid, propanoic acid and butanoic acid are the first four of the homologous series.
	Carboxylic acids react with carbonates, water and alcohols.	Carboxylic acids and carbonates: These acids are neutralised by carbonates
		Carboxylic acids and water: These acids dissolve in water.
		Carboxylic acids and alcohols: The acids react with alcohols to form esters.
	Carboxylic acids are weak acids	Carboxylic acids only partially ionise in water. An aqueous solution of a weak acid with have a high pH (but still below 7).

Addition polymerisation

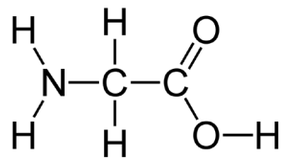
	Alkenes are used to make polymers by addition polymerisation.	Many small molecules join together to form polymers (very large molecules).
	In addition polymers, the repeating unit has the same atoms as the monomer.	It can be displayed like this: 

Condensation polymerisation (HT only)

	Condensation polymerisation involves monomers with two functional groups	When these types of monomers react they join together and usually lose small molecules, such as water. This is why they are called condensation reactions.

Amino acids

Amino acids have two functional groups in a molecule. They react by condensation polymerisation to produce peptides.


Glycine

DNA and naturally occurring polymers

	Deoxyribonucleic acid is a large molecule essential for life. DNA gives the genetic instructions to ensure development and functioning of living organisms and viruses.
	Most DNA molecules are two polymer chains made from four different monomers, called nucleotides. They are in the double helix formation.
	Other naturally occurring polymers include proteins, starch and cellulose and are all important for life.

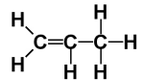
Synthetic and naturally occurring polymers

AQA GCSE Organic chemistry 2 (CHEMISTRY ONLY)

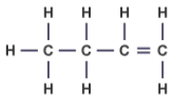
Structure and formula of alkenes

Alkenes	
Unsaturated	
General formula for alkenes	

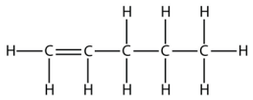
Ethene C_2H_4



Propene C_3H_6



Butene C_4H_8

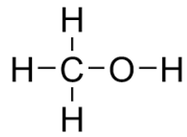


Pentene C_5H_{10}

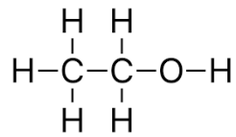
Reactions of alkenes

Functional group		The functional group of an organic compound determined their reactions.
Alkene reactions		Alkenes also react with hydrogen, water and the halogens. The C=C bond allows for the addition of other atoms.

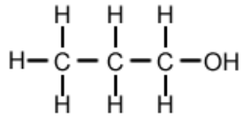
Alcohols



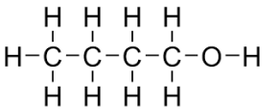
Methanol



Ethanol



Propanol



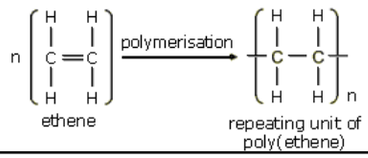
Butanol

Functional group		Methanol, ethanol, propanol and butanol are the first four of the homologous series.
Alcohol reactions		Alcohols and sodium: bubbling, hydrogen gas given off and salt formed. Alcohols and air: alcohols burn in air releasing carbon dioxide and water. Alcohols and water: alcohols dissolve in water to form a neutral solution.
Fermentation		When sugar solutions are fermented using yeast, aqueous solutions of ethanol are produced. The conditions needed for this process include a moderate temperature (25 – 50°C), water (from sugar solution) and an absence of oxygen.

Carboxylic acids

Functional group		Methanoic acid, ethanoic acid, propanoic acid and butanoic acid are the first four of the homologous series.
Carboxylic acid reactions		Carboxylic acids and carbonates: These acids are neutralised by carbonates
		Carboxylic acids and water: These acids dissolve in water.
		Carboxylic acids and alcohols: The acids react with alcohols to form esters.
Strength (HT only)		Carboxylic acids only partially ionise in water. An aqueous solution of a weak acid with have a high pH (but still below 7).

Addition polymerisation

Polymers		Many small molecules join together to form polymers (very large molecules).
Displaying polymers		It can be displayed like this:  ethene polymerisation repeating unit of poly(ethene)

Condensation polymerisation (HT only)

Amino acids

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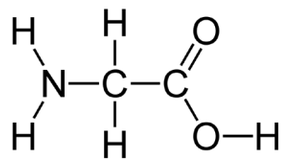


Glycine

Condensation polymerisation		When these types of monomers react they join together and usually lose small molecules, such as water. This is why they are called condensation reactions.

DNA and naturally occurring polymers

DNA	
DNA structure	
Natural polymers	

Synthetic and naturally occurring polymers

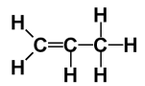
Reactions of alkenes and alcohols

AQA GCSE Organic chemistry 2 (CHEMISTRY ONLY)

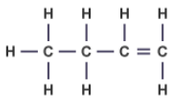
Structure and formula of alkenes

Alkenes	
Unsaturated	
General formula for alkenes	

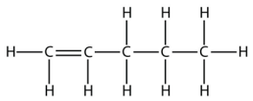
Ethene C_2H_4



Propene C_3H_6



Butene C_4H_8

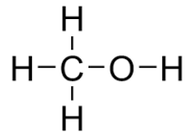


Pentene C_5H_{10}

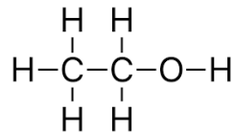
Reactions of alkenes

Functional group		
Alkene reactions		

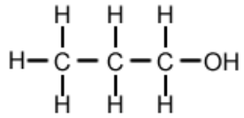
Alcohols



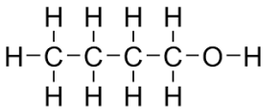
Methanol



Ethanol



Propanol



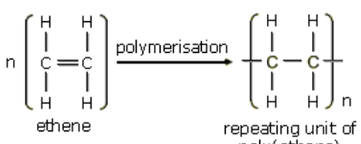
Butanol

Functional group		
Alcohol reactions		
Fermentation		

Carboxylic acids

Functional group		
Carboxylic acid reactions		
Strength (HT only)		

Addition polymerisation

Polymers		
Displaying polymers		It can be displayed like this: 

Synthetic and naturally occurring polymers

Condensation polymerisation (HT only)

Condensation polymerisation		

Amino acids

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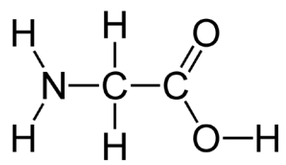

Glycine

DNA and naturally occurring polymers

DNA	
DNA structure	
Natural polymers	