EDEXCEL TOPIC 9: Separate Chemistry 2 (2)

Nanoparticles	*Between 1 and 100 nanometres (nm) in size*	1 nanometre (1 nm) = 1 x 10^{-9} metres (0.000 000 001m or a billionth of a metre).

Nano particles

Use of nanoparticles include healthcare, cosmetics, sun cream, catalysts, deodorants, electronics.	Nanoparticles have a large surface area to volume ratio. Nanoparticles may be toxic to people. They may be able to enter the brain from the bloodstream and cause harm.

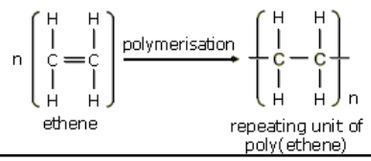
Polymer issues	*Raw materials originate from crude oil, a finite resource.*	Polymers are non-biodegradable and add to the growing landfill problem. When combusted, they release harmful gases which can contribute to global warming.
Recycling polymers	*Advantages include conserving finite resources, reducing release of harmful gases and reducing landfill.*	Disadvantages of recycling polymers include the cost of the process.

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.*

Polymers

Polymer	*Properties and uses*
Poly(ethene)	*Flexible, cheap, electrical insulator. Used for plastic bags and bottles and coating on electrical wires.*
Poly(propene)	*Flexible and strong. Used for buckets and crates.*
Poly (chloroethene) (PVC)	*Tough, cheap and long lasting. Used for window frames.*
Poly(tetrafluoroethene) (PTFE)	*Tough and non-stick. Used for non-stick coating on pans.*

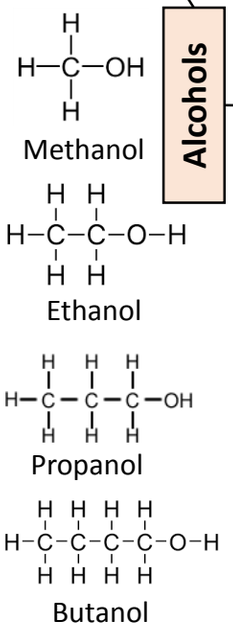
Addition polymerisation

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: 

Condensation polymerisation (HT only)

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. Example: polyester.

Alcohols



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.