

AQA Chemistry A-Level

3.3.12: Polymerisation

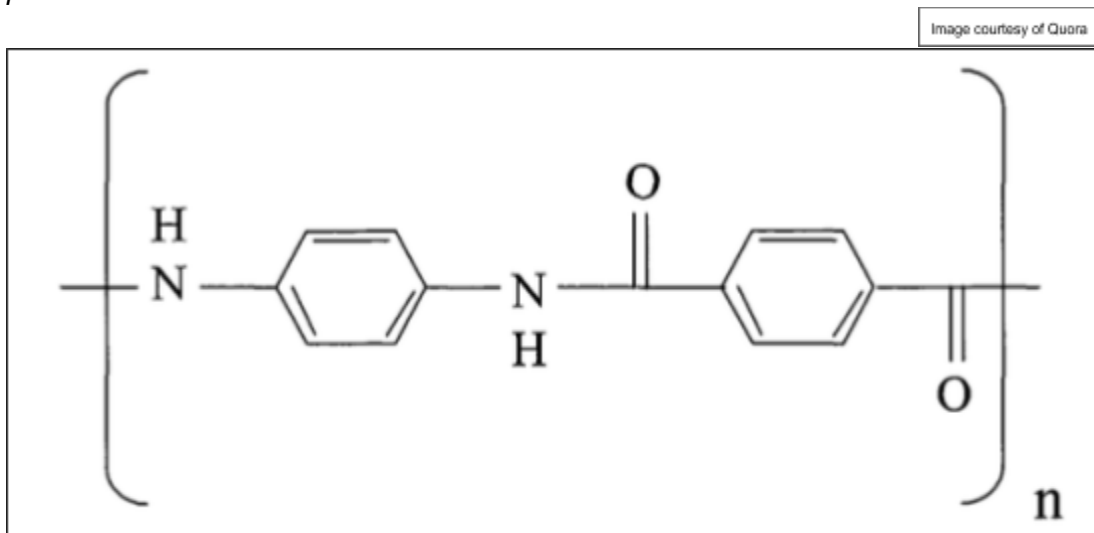
Detailed Notes





Kevlar is another common polyamide made from 1,4-benzenedicarboxylic acid and 1,4-benzenediamine.

Example:

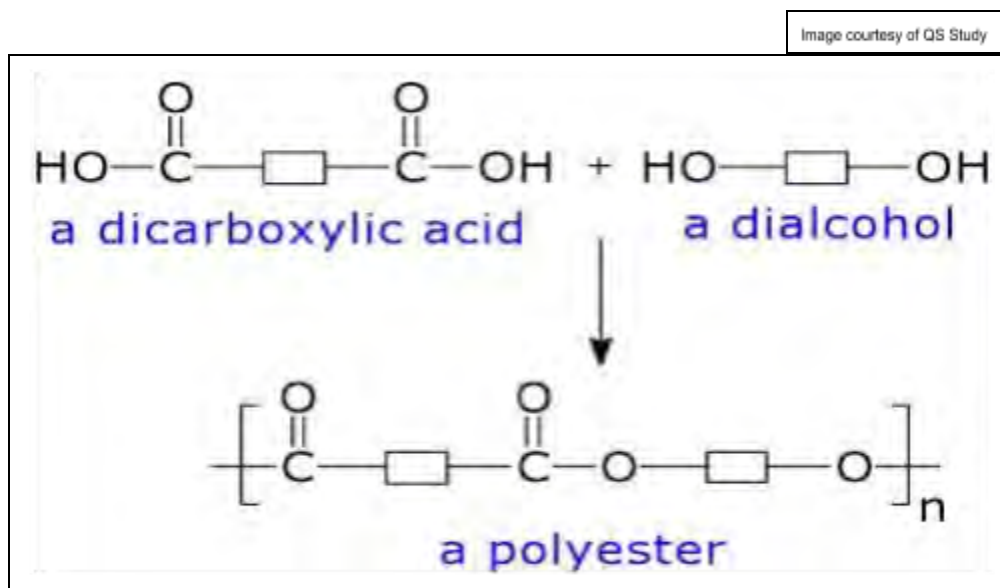


Polyamides are commonly formed from **long chain molecules** which provides them with **strength**.

Polyesters

These are formed in a reaction between **dicarboxylic acids and a diol**, producing an **ester linkage**.

Example:



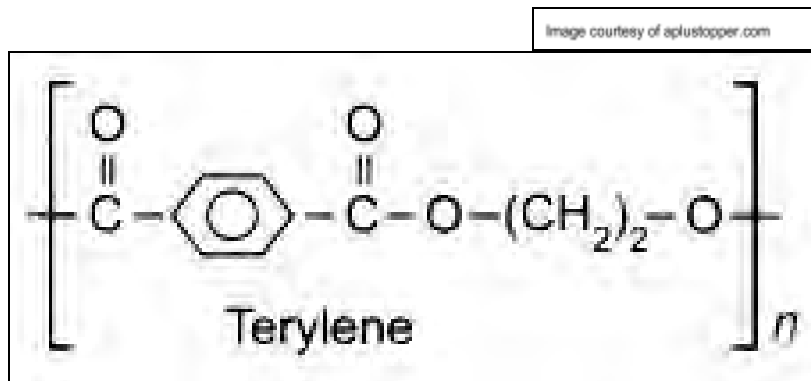
-COO- is the ester linkage.





Terylene (PET) is a common polyester made from ethanediol and 1,4-benzenedicarboxylic acid.

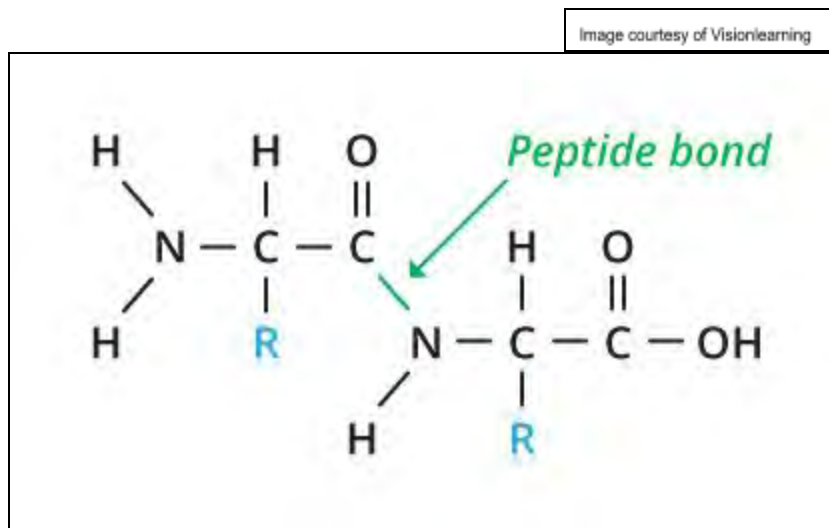
Example:



Polypeptides

These molecules are formed from **multiple amino acids**. A single monomer can produce a polymer due to the presence of both a **-H** and **-OH** group.

Example:



-CONH- is the peptide linkage.

Hydrolysis

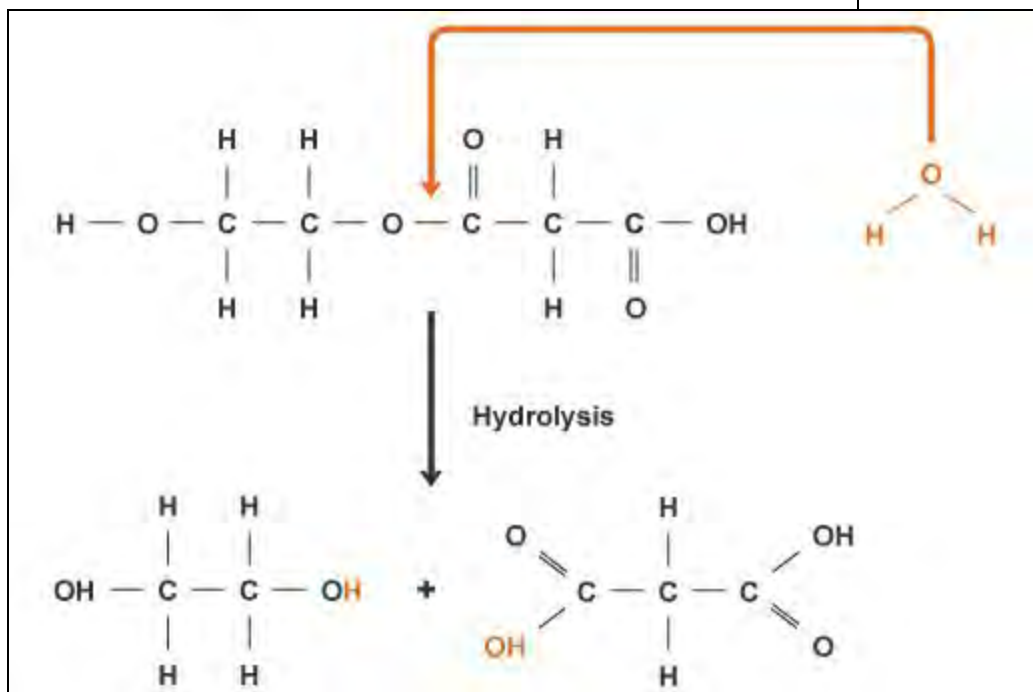
Condensation polymers can be **broken down** back into the constituent molecules by the **addition of H₂O**. This is because water is attracted to the **polar regions** of the polymer meaning the links can be broken down.





Example:

Image courtesy of Socratic

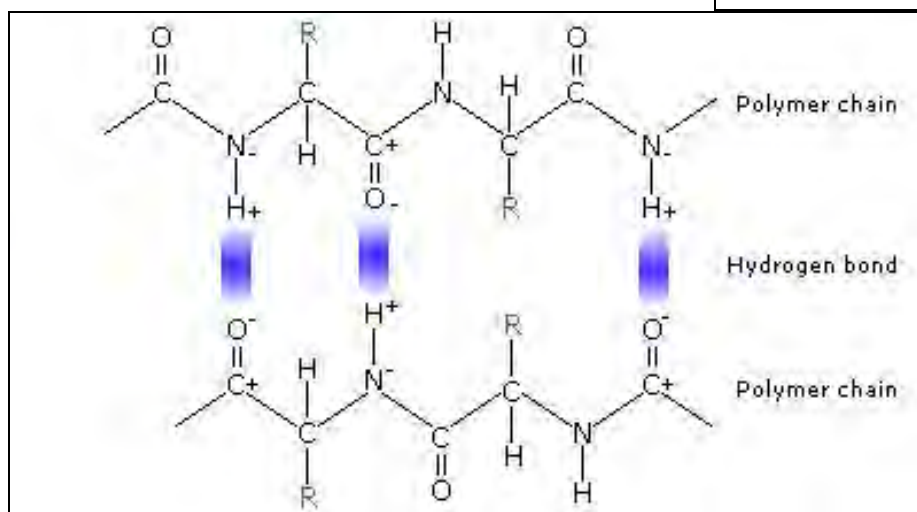


Uses of Condensation Polymers

Condensation polymers contain **polar bonds** such as those in the ester and amide links. **Hydrogen bonding** and **dipoles** can also form between separate polymer chains, holding them together in a strong structure.

Example:

Image courtesy of Textiles FR



This makes the polymers very useful for things such as **bulletproof vests** and **heat protective materials**.



3.3.12.2 - Disposal of Polymers

All polymers are very useful but can be **hard to get rid of as waste products**.

Polyalkenes (addition polymers) are very **inert** with **non-polar bonds** meaning they are not easily broken down by species in nature. They are **non-biodegradable**. Therefore they have to be broken down by **burning** which produces harmful products such as SO_2 or CO which can lead to acid rain.

Polyesters and polyamides can be broken down through **hydrolysis** due to the **polarity** within the polymer molecules. Therefore they are **biodegradable** and can be broken down easily in nature by naturally occurring water or moisture. This means polyester and polyamides can be put into **landfill** and will gradually breakdown.

Some plastics can also be **recycled**, saving natural resources and reducing the amount of waste that has to be put into landfill. However, it is a **difficult and time consuming** process as all the plastics have to be **sorted and washed** before they can be recycled.

Example:

