Types

① Thermoplastic Polymers

- Soften when heated, harden on cooling. The long chains slide over each other when temp is high, but then bond to one another when cooled.

→ are flexible, yet strong, and mouldable.
→ Examples: Polyethene, PVC

② Thermosetting Polymers

- Rigid solid as soon as made, not mouldable

→ Used in: Used instead of marbles on countertops

Important Properties

↳ Chain length: tensile strength increases with chain length, because there are more IMF if chains are longer.

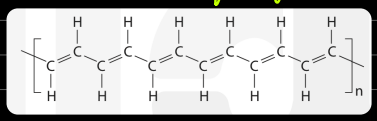
↳ Chain flexibility: Its high if chain is thin and long, while less when chain is made of longer molecules. Eg: Polyethene is flexible, Kevlar is much more rigid

↳ Side groups: different polymers have different side-groups on their chain, Eg: PVC has Cl atoms as side groups. Polar side groups like Cl increase IMF, so stronger attraction than polyethene ∴ PVC is stronger and harder to melt.

↳ Branching: Highly branched polymer chains cannot pack together as tightly and neatly as unbranched ∴ highly branched have lower tensile strength and melt easily. They also have low density

↳ Cross-linking: It is a bond that links one polymer chain to another: can be covalent or ionic. Cross linking makes polymers like rubber stronger, harder, less flexible and less 'sticky'

↳ Conducting polymers: Most polymers are insulators. However, some polymers contain delocalised electrons which can move and conduct electricity



Differences	Addition polymers	Condensation polymers
The type of reaction	Addition reaction only	Addition reaction followed by elimination reaction, resulting in the condensation of a small molecule such as H_2O or HCl
Type of links along the central chain	C-C single bonds only, which are non-polar	Short aliphatic or aryl sections linked by either ester groups or amide groups, which are polar
The type of monomer involved	All monomers have C=C double bond	The monomers have molecules with at least two functional groups, which may be the same or different
Hydrolysis	Resistant to hydrolysis	Undergo hydrolysis

- Only condensation polymers are biodegradable
- PLA (Poly lactic acid) is biodegradable.
- some polymers, known as photodegradable polymers can be broken down by light, generally this can be acheived by incorporating, C=O, at intervals down the length of the polymer, this bond breaks down when exposed to UV light

→ Few examples; Synthetic Poly ester : Terylene
" Polyamide : Nylon, Kevlar
Natural Polyester : fats
Natural Polyamide : Protein

- Vary in properties like tensile strength, flexibility and softening temperature
  - → Nylon: strong, not easily stretched; so used as fibres.
  - Polyethane & PVC: Easily shaped;

Disposal of Polyalkenes

As it becomes more and more expensive to dump waste in landfill sites, plastics are seen as an increasing problem.

The major problem with most plastic waste is that it is non-biodegradable.

This means that the only choices for dealing with plastic waste are recycling and energy recovery.