

There are two different types of manufactured / synthetic polymers:

- ◆ Thermosetting polymers
- ◆ Thermoforming polymers

Keyword: polymer

◇ *A scientific term for a fibre that has a molecular structure made up of smaller units bonded together.*

- ◆ Thermosetting and thermoforming polymers are used throughout textiles but for different purposes.
- ◆ The classification of these polymers are the same ones listed under synthetic (or manufactured) fibres.

## Thermoforming polymers

- ◆ These can be softened by heating and formed or moulded into a required shape – in pleating or moulding fabrics for example.
- ◆ On cooling, thermoforming polymers retain the new shape.
- ◆ Polyester, nylon, polypropylene and acrylic are all thermoforming polymers.
- ◆ Thermoforming polymers can be reheated and reshaped making recycling possible.
- ◆ Polyester and nylon work well in the process of pleating as they are pliable above a certain temperature but will not melt.
- ◆ Polythene, polystyrene and polyvinyl chloride (PVC) are also thermoforming polymers but are not as widely used in fashion garments.

## Working properties of fibres and fabrics

- ◆ **Tensile strength:** refers to the force needed to break a fibre.
- ◆ **Strength:** the higher the number of interlacing yarns, the stronger the fabric. Twill weave is stronger than plain weave for example.
- ◆ **Elasticity:** the extent a fibre will stretch before breaking and how well it recovers after stretching.
- ◆ **Absorbency:** the fibres' ability to take in or soak up moisture without feeling wet.
- ◆ **Durability:** refers to the fibre or fabrics ability to withstand wear and tear when subjected to friction.
- ◆ **Insulation:** the ability to trap air (gaps in between fibres or yarns) and retain heat allowing the fabric to act as an insulator, for example knitted fabric.
- ◆ **Flammability:** how easily a fibre or fabric burns. An open structure on a fabric will burn more easily. Cotton is highly flammable.
- ◆ **Water repellence:** the ability to repel water; wool has a natural grease (lanolin) on its surface which repels water.
- ◆ **Anti-static:** static refers to the electrostatic charge that builds up through friction in some fabrics. Some fabrics do not give off a static charge.
- ◆ **Resistant to acid and bleach:** the ability to resist damage through exposure to acid or bleach.
- ◆ **Resistant to sunlight:** ability to reflect UV rays to prevent damage to the fibre or fabric.
- ◆ **Weight:** fabric construction and thickness of yarn affect the weight of the fabric. Densely woven cloth like denim is heavy, chiffon is lighter.

## Thermosetting polymers

- ◇ These polymers can be heated and formed into a specific shape – often complex shapes.
- ◇ On cooling these polymers cannot be reheated or reshaped.
- ◇ This makes thermosetting polymers difficult to recycle.
- ◇ Textile components such as plastic clips and buckles, can be made from thermosetting polymers.
- ◇ Plugs on sewing machines and other electrical equipment are made from a thermosetting polymer.
- ◇ Polyester resin is a thermosetting polymer used to bind the fibres in CFRP (carbon fibre reinforced polymer).



Pleated polyester satin fabric – a thermoforming polymer



Electric 3-pin plug - a thermosetting polymer