

1.10 Thermoforming and Thermosetting Polymers

Properties:



Heat Insulators: Most polymers are excellent insulators of heat. Allowing them to increase the safety of products.



Electrical Insulator: are commonly used in products that contain electrical components. Without adequate insulation around the exterior the products could cause serious injury to the user.



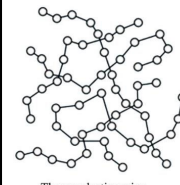
Toughness: Is the ability of a material to withstand being hit. Most polymers are tough meaning they can be handled roughly making them suitable for a range of everyday products.

Synthetic Polymers: A synthetic material made mostly from oil, normally referred to as plastic.

Glass Reinforced Plastic (GRP): a composite material made from resin and glass fibres.

Thermoforming Polymer:

A material that can be reshaped by the application of heat. This type of material can be recycled and made into other products. Made up of long chains of **loose molecules** that have **no fixed structure** or pattern.

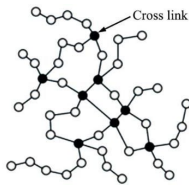


Thermoplastic resins



Thermosetting Polymers:

A material that cannot be reshaped by reheating. This type of material cannot be recycled. Long chains of molecules are **cross linked** resulting in a **rigid** molecular structure.



Thermosetting resins



Acrylic:

Tough, Easily finished, Easily Cleaned, Food safe and can be easily scratched

Shop signs, baths, fish tanks and menu holders

Widely available, Common in the school environment as it is easy to cut and finish to a high standard. Can be shaped using heat. Does not need painting. Breaks easily if dropped

High-impact polystyrene (HIPS):

Lightweight, High stiffness, Impact resistant, Can be scratched easily

Toys, Television parts and refrigerator linings.

Commonly used for vacuum forming, Has a low melting point, Becomes brittle when exposed to UV light

Biopol:

Lightweight, Good electrical insulator, Degrades over time when in contact with soil

Disposable cups, razors, cutlery and other packaging products, surgical stitches

Degrades in soil and can be disposed of at landfill sites. Can be injection moulded and vacuum formed. Expensive to produce and has a low resistance to impact.

Polyester resin:

Rigid, Brittle, Good electrical and heat insulation, Good chemical resistance

Boat hulls, sports car bodies. Cast into decorative objects.

Can be used with glass fibres to create lightweight and very strong products. Can be polished to a high finish. Can chip if dropped

Urea formaldehyde:

Rigid, Brittle, Hard, Heat resistant, Excellent electrical insulation

Electrical fittings, plugs, sockets and switches

Can be coloured using pigments. Can break if dropped