

Making nylon

Transcript

Polymers are large chain-like molecules built up from smaller molecules called monomers.

Nylon, a synthetic polymer, has many practical uses and was first produced in 1935 as a replacement for silk.

Nylon is a polyamide and is made using a dicarboxylic acid and a diamine. The two molecules react and release water. This is known as a condensation reaction. This links the two molecules together forming a new group known as an amide. Here is a small-scale demonstration for how nylon is made.

In this experiment, instead of using a dicarboxylic acid, a diacyl chloride is used as it provides a faster reaction.

First, five centimetres cubed of the diamine solution is measured out using a measuring cylinder and is then added to the small beaker.

Next, five centimetres cubed of the diacyl chloride solution is measured out using the second measuring cylinder.

This solution is poured slowly down the side of the beaker or poured down a glass rod.

The diacyl chloride settles above the diamine solution. The two solutions are immiscible and sit as two layers in the beaker.

A greyish nylon film can be observed where the two layers meet. The nylon film is pulled out of the beaker using tweezers.

As the nylon is pulled out, more nylon is created at the interface between the two monomer layers. The nylon is now attached to the spindle. Alternatively, a glass rod or cotton reel could be used. Once attached, the thread can be slowly wound around the spindle.

More nylon thread can be collected so long as there are enough of the monomer solutions in the beaker. The diacyl chloride and diamine react together in a condensation reaction; and is an example of condensation polymerisation. Because a diacyl chloride was used, the waste product is hydrochloric acid instead of water.

The hollow nylon thread is therefore washed with ethanol as chemicals might be trapped in the centre.

Nylon is a long, strong polymer with amide groups linking the monomers together. Nylon has many applications. Some examples include: heavy duty ropes, brushes, water-proof clothing, seat belts, and dental floss.

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