



How Plastics and Polymers Are Made

KS4 CHEMISTRY

MATERIALS SCIENCE

Ages 11-16 ⌚ 4 min read

What Are Polymers?

Polymers are long chains of tiny particles called **monomers** that link together like beads on a string. Most of the plastics we use every day—from shopping bags to phone cases—are made from polymers. The word 'polymer' comes from Greek: 'poly' means many, and 'mer' means part.

Think of it like building a massive train from individual train cars. Each car is a monomer, and when you link hundreds of them together, you get a polymer—a long, strong chain.

Where Do Polymers Come From?

Most plastics start with **crude oil**, a fossil fuel found deep underground. Crude oil contains **hydrocarbons**—molecules made of hydrogen and carbon atoms. Scientists heat crude oil to break it down into smaller pieces in a process called **fractional distillation**. This creates useful chemicals like **ethene**, which is perfect for making plastics.

Making Monomers Into Polymers

The key process is called **polymerisation**, and there are two main types. **Addition polymerisation** is the most common. In this process, monomers join together directly, link by link, without creating any waste products. It's like a chain reaction where each monomer hooks onto the growing chain.

Think of it like a magnetic snake toy—each segment connects to the next one, and as more segments link together, you create one long, flexible chain.

Condensation polymerisation is slightly different. When monomers join together, they release a small molecule (usually water) as a byproduct. This process creates plastics like **polyester** and **nylon**.

From Polymer to Plastic Product

Once the polymer chains are made, the plastic is melted and shaped into tiny pellets. These pellets are transported to factories where they're melted again and formed into different products—bottles, bags, toys, or car parts. The shape and properties depend on how the polymer was made and what additives were mixed in.

The Problem with Plastics

While plastics are incredibly useful, they last a very long time in nature—sometimes **hundreds of years**. This is why scientists are developing **biodegradable polymers** made from renewable sources like plants, which break down more naturally in the environment.