Cracking: How Oil Companies Break Down Crude Oil

KS4 CHEMISTRY Ages 11-15 ⏰ 3 min read

What is Cracking?

Cracking is a chemical process where large **hydrocarbon** molecules (the molecules in crude oil) are heated and broken down into smaller, more useful molecules. When crude oil comes out of the ground, it contains a mixture of different-sized molecules. Some are enormous and heavy, while others are smaller and lighter. The problem is that we don't need the huge ones very much—we need the smaller ones instead.

The process works by heating crude oil to very high temperatures (around **800 to 900 degrees Celsius**) and then passing the vapour through a catalyst, which is a substance that speeds up the chemical reaction. This extreme heat causes the long chains of atoms to snap apart, creating shorter, more valuable molecules.

Think of it like breaking a long chain into smaller pieces. Imagine you have a giant chain made of **100 links**, but you really need chains with **5 or 10 links** instead. Cracking is the tool that snaps that long chain into the sizes you actually want.

Why is Cracking Useful?

Cracking is incredibly useful because crude oil contains far too many heavy, long-chain molecules and not enough of the lighter ones we need. Without cracking, oil companies would have lots of leftover thick oil (called **fuel oil**) that's hard to use, and not enough petrol and diesel for our cars.

After cracking, the **smaller molecules** produced can be used for:

Petrol (gasoline) for cars and motorbikes. **Diesel** for lorries, buses, and ships. **Kerosene** for aircraft fuel. **Plastics**, fabrics, and chemicals used in medicines and paint.

This means a single barrel of crude oil produces much more usable fuel. Without cracking, we'd waste huge amounts of oil and run out of petrol much faster than we do now.

Think of it like a bakery. If you only had huge bags of flour, you'd be stuck. But if you divide each big bag into smaller portions, you can bake more bread, cakes, and biscuits. Cracking does the same thing with oil molecules.

Two Types of Cracking

Thermal cracking uses extreme heat alone. **Catalytic cracking** uses heat plus a catalyst to make the reaction happen more efficiently and at lower temperatures. Catalytic cracking is more common in modern refineries because it's faster and uses less energy.