Cracking and alkenes

Alisha Kakar: How do we turn a thick, heavy crude oil into useful fuels like petrol?

Well, the answer lies in cracking and alkenes.

Crude oil is made up of many different hydrocarbons, but not all of them are suitable as fuels.

This is the structure of a large alkane molecule.

We can see the molecule breaking apart into smaller pieces.

This is the cracking process.

Molecules turn into smaller, more useful hydrocarbons that can be used for petrol and alkenes, which can be used to make plastics.

Let's break it down.

When we crack a large alkane, we get two types of products.

We can identify them using their general formulas alkanes and alkenes.

Here's an example.

Let's start with $C_{11}H_{24}$.

That's a long chain alkane.

To find the formula of the second product, we can use the original molecule's formula and subtract this from the formula of the known products.

This will then give us the formula of the second product.

One possible product might be C_6H_{14}, which is another alkane.

We can find the second product by subtracting the atoms in the existing product from the original molecule.

This way we know the second product has five carbon atoms and ten hydrogen atoms.

That's C5 H10.

The final piece of our balanced equation.

The second product is an alkene.

If it were an alkane, it would need two more hydrogen atoms.

Cracking can split the carbon chain in different places, so the products are usually a mixture of alkanes and alkenes.

In oil refineries, cracking isn't just a chemical process, it's a crucial part of the business.

Supply is what refineries produce, and demand is the amount customers want to buy.

Cracking helps balance the supply and demand, turning long hydrocarbons into smaller, more valuable ones that customers need.

Now it's your turn.

Over to you for a challenge.

C16 H34 is an alkane which can be used as the starting material in cracking.

One of the products is an alkane with ten carbon atoms in it.

Can you write a balanced equation for this cracking reaction?

You can pause the video while you work it out.

Alkanes must follow the general formula.

For ten carbon atoms, that's C10 H22.

We use the formula: original molecule subtract known products equals second product.

Subtracting those atoms from the original molecule gives us six carbon atoms and twelve hydrogen atoms.

And there we have it, a balanced equation.

When working out the products of cracking, make a note and remember the general formulas for alkanes and alkenes.

Now that is cracking chemistry.