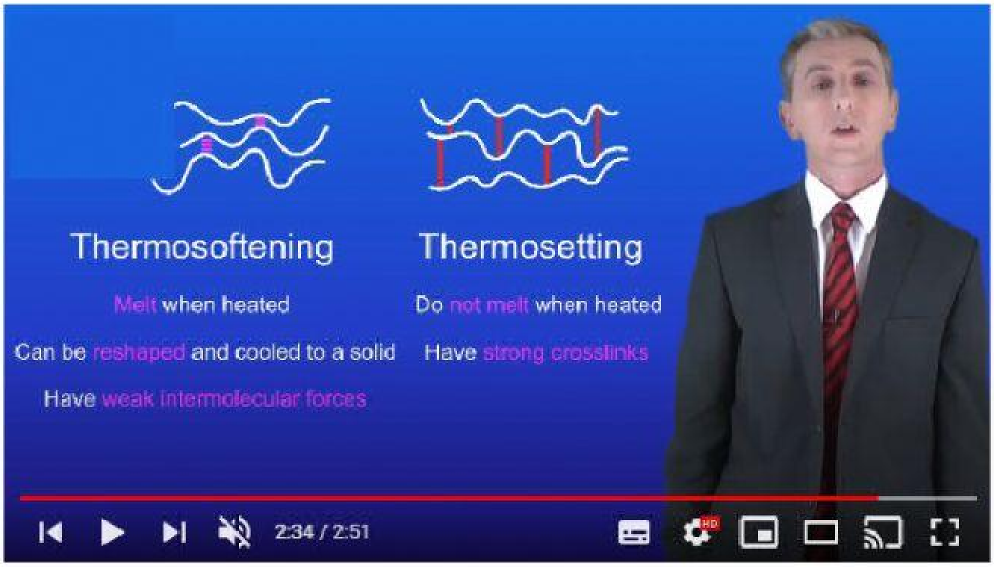
Thermosoftening and thermosetting polymers (https://youtu.be/lmYCDMWBqRo)



Hi, welcome back to free science lesson dot co dot you key (freesciencelessons.co.uk/). By the end of this video you should be able to describe and explain the properties of **thermalsoftening** (**termoplásticos**) and **thermosetting** (**termoestables**) polymers.

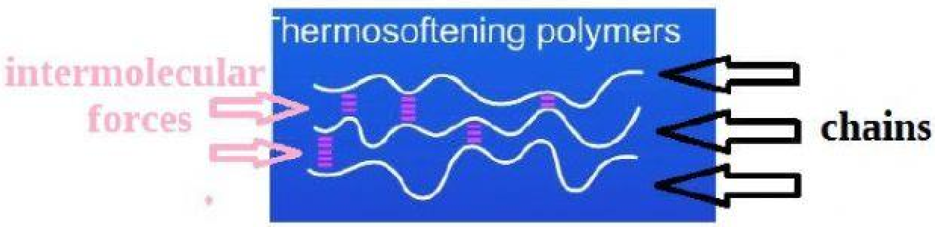
This comes up (Esto surge) in the exam almost every year. Many __________ are __________ and it's very easy to produce polymers with different properties if we simply change the conditions that were used to __________ them.

A good example is **polythene** (**PE** 2,4 /poli'izin/). This is used to make plastic bottles. _____ __________ **polyethylene** (**LDPE**, 4) is used to produce the main part of the bottle, which is soft, but if we change the conditions or the catalyst (catalizador) we can produce a harder version called _____ __________ **polyethene** (**HDPE**, 2) which is used for lids (tapones).

Now in this video we're going to focus on two different groups of polymers called **thermosoftening** (termoplásticos) and **thermosetting** (termoestables). You should be able to explain their __________ in terms of their __________ so we start by looking at **thermalsoftening** (termoplásticos) polymers.

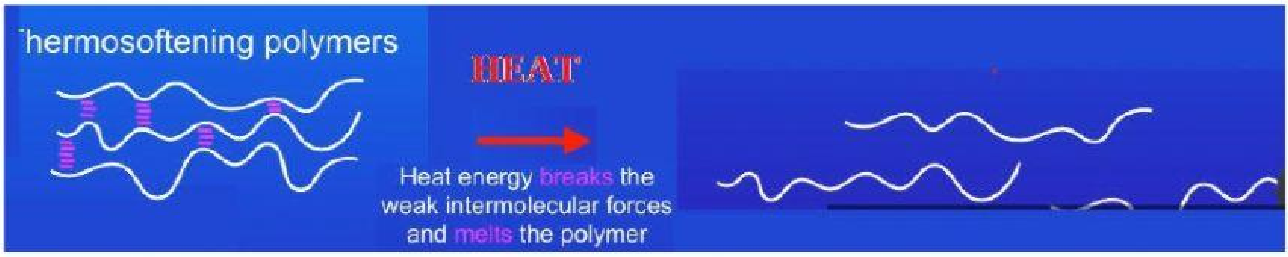
Now **thermalsoftening** polymers (termoplásticos) __________ (funden) when __________ so they can be __________ (re-formar/formar de nuevo). They then *go back* to a solid when cooled back down.

Let's take a look at the structure of **thermalsoftening** polymers and see why they melt when they're heated. Here's the **structure** of **thermalsoftening** polymers.

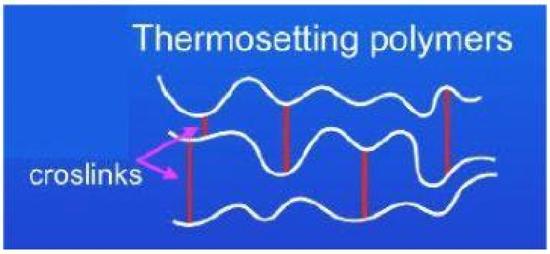


This diagram is often showing in exams so it's worth (merece la pena) learning. You can see that we have polymer __________. These are __________ together by **weak** (débiles) **intermolecular forces** under that's really important to learn.

If we heat **thermalsoftening** polymers the heat energy causes the **weak intermolecular forces** to vibrate and then __________ and this melts the polymer. Now if we cool the melted polymer we reform the **intermolecular forces** and the polymer goes back to a solid. OK.



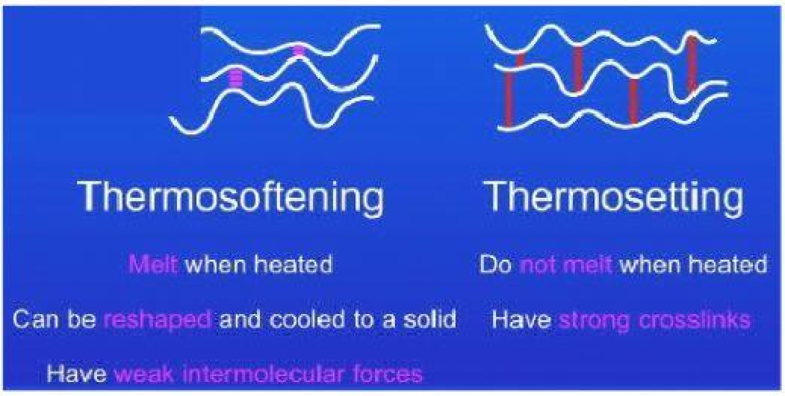
Now we're going to look at another type of polymer called **thermosetting** (termoestable). The key (clave) feature of **thermosetting** polymers is that they will not __________ when __________ so let's look at the **structure** of these molecules.



So you can see that **thermosetting** polymers also have polymer __________ but this time they're connected to each other (unas a otras) by **strong** (fuertes) **cross links** (enlaces cruzados). The **strong cross links** are not broken by heat so **thermosetting** polymers do not melt (funden).

So let's recap (recapitulemos). **Thermalsoftening** polymers will __________ when __________. They can be __________ and cooled back to a solid. **Thermosoftening** polymers have **weak** **intermolecular forces** holding (sujetando) the chains to each other (unas a otras).

Thermosetting polymers do not __________ when __________ and that's because they have **strong** **cross links** holding (sujetando) the chains to each other. OK.



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So hopefully (afortunadamente) now you can describe and explain the properties of **thermosoftening** and **thermosetting** polymers.