

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

The video player displays a comparison between thermosoftening and thermosetting polymers. On the left, under 'Thermosoftening', it shows a diagram of wavy lines representing polymer chains with small gaps between them. Below this, it states: 'Melt when heated', 'Can be reshaped and cooled to a solid', and 'Have weak intermolecular forces'. On the right, under 'Thermosetting', it shows a diagram of wavy lines representing polymer chains with vertical red bars connecting them, indicating crosslinks. Below this, it states: 'Do not melt when heated' and 'Have strong crosslinks'. A presenter in a suit is visible on the right side of the video frame. The video player controls at the bottom show a progress bar at 2:34 / 2:51.

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

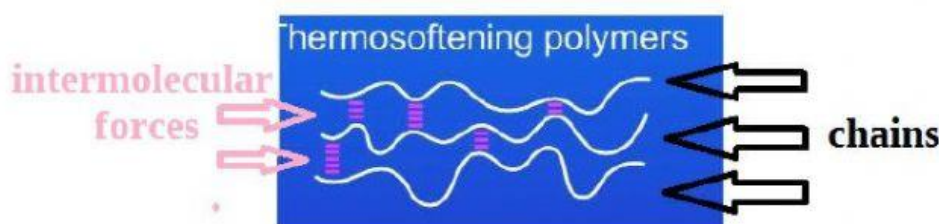
This comes up (Esto surge) in the exam almost every year. Many _____ are _____ and it's very easy to produce polymers with different properties if we simply change the conditions that were used to _____ them.

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 _____ **polyethylene** (**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 **thermosoftening** (**termoplásticos**) polymers.

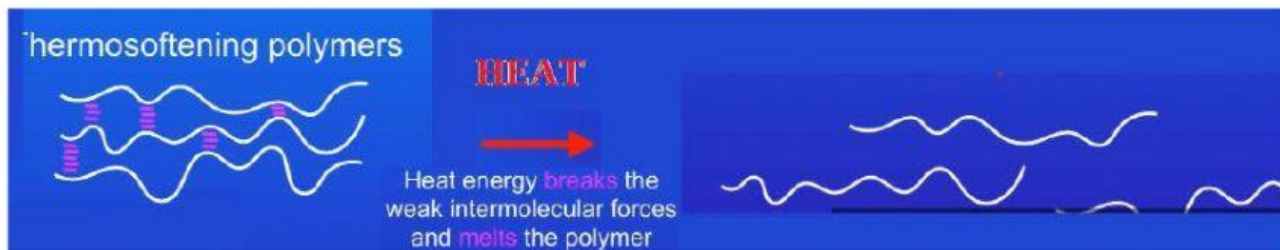
Now **thermosoftening** polymers (**termoplásticos**) _____ (funden) when _____ so they can be _____ (re-formar/formar de nuevo). They then *go back* to a solid when cooled back down.

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

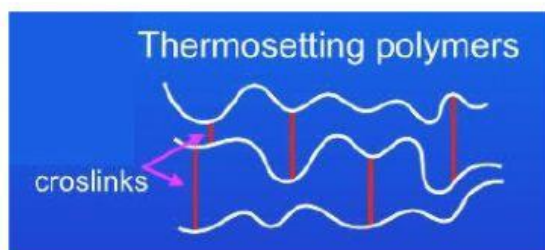


This diagram is often showing in exams so it's worth (merece la pena) learning. You can see that we have polymer _____. These are _____ together by **weak** (**débiles**) **intermolecular forces** under that's really important to learn.

If we heat **thermosoftening** 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). **Thermosoftening** 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.

Thermosoftening	Thermosetting
Melt when heated	Do not melt when heated
Can be reshaped and cooled to a solid	Have strong crosslinks
Have weak intermolecular forces	



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