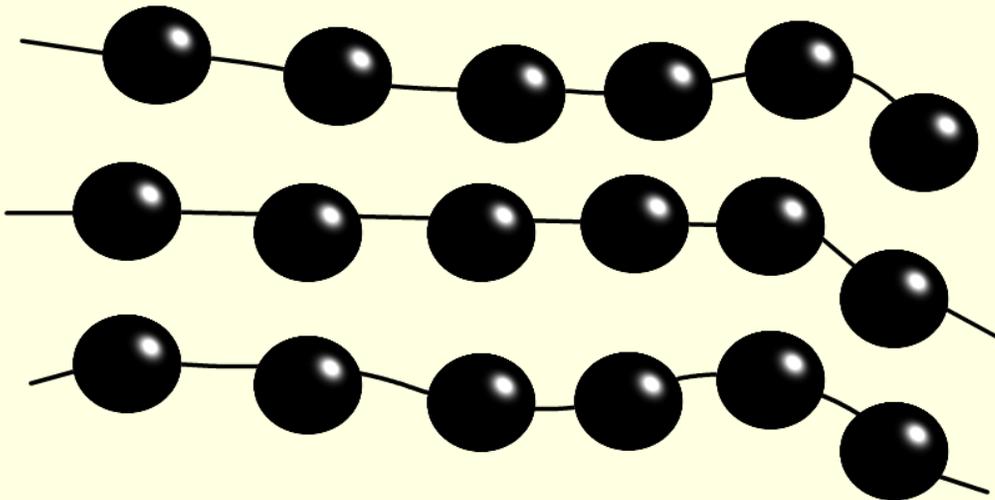


Addition polymer properties

Answer all the questions below then check your answers

1. What is the difference between a thermosoftening and a thermosetting polymer?
2. The simplified image below represents a thermosoftening polymer



- a. What do the black beads represent in the image above?
 - b. Draw a similar image to show how the beads would be arranged in a thermosetting polymer.
 - c. Explain why a thermosoftening polymer melts when heated but a thermosetting one will not.
 - d. Explain why thermosoftening polymers are likely to be more flexible than thermosetting polymers when heated.
3. Explain why HDPE and LDPE have different properties.

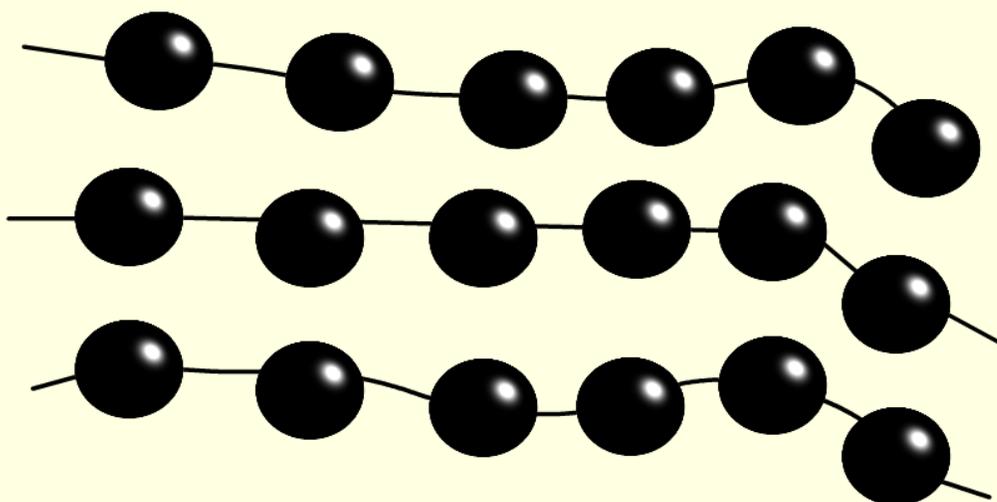
Addition polymer properties

Answers

1. What is the difference between a thermosoftening and a thermosetting polymer?

Thermosetting polymers contains long polymer chains which contain cross-links or covalent bonds between the chains. Thermosoftening polymer contain long chains with no cross-links between the chains. Thermosoftening polymers when heated will melt and can then be reshaped or moulded, thermosetting polymers will not melt, if heated they will char and eventually decompose and catch fire.

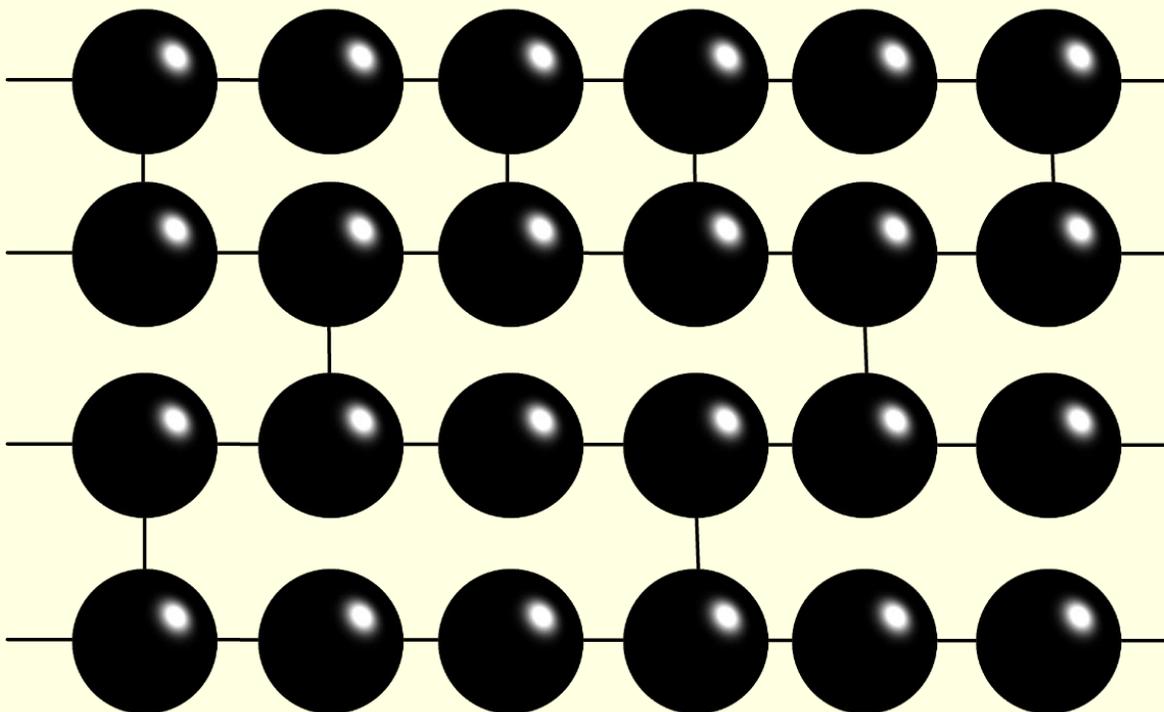
2. The simplified image below represents a thermosoftening polymer



- a. What do the black beads represent in the image above?

The repeating unit of the polymer

- b. Draw a similar image to show how the beads would be arranged in a thermosetting polymer.



- c. Explain why a thermosoftening polymer melts when heated but a thermosetting one will not.

When a thermosoftening polymer is heated the polymer chains are able to move and slide over each other, this allows the polymer to soften and melt. However in a thermosetting polymer because the polymer chains have cross-links between them they cannot move, so when the polymer is heated the chains will vibrate faster and faster but will not be able to move or slide over each other.

d. Explain why thermosoftening polymers are likely to be more flexible than thermosetting polymers when heated.

In a thermosoftening polymer the chains are able to move due to the fact that they only have weak intermolecular bonding between them, but no such movement is possible in a thermosetting polymer since the polymer chains have covalent bonds (often called cross-links) between them, this prevents them from moving.

3. Explain why HDPE and LDPE have different properties.

LDPE consists of long branched polymer chains which cannot pack together well due to their shape. This makes them flexible, transparent with a low density. HDPE consists of regular shaped straight chains which can pack together more closely, this means more intermolecular bonding and a denser, stronger and stiffer polymer with a higher melting point .