

3.2 Plastics

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Plastics are examples of materials known as polymers.

- Polymers are long chain molecules formed by joining together a large number of small molecules called monomers.
- Addition polymerisation is the name given to a chemical reaction in which unsaturated monomers are joined, forming a polymer.

Name	Definition
monomer	Small molecules which join together to form polymers
polymer	The long chain molecule made by the joining up of monomers
polymerisation	The process where monomers join together to form polymers

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The name of the addition polymer is related to the name of the monomer:

Monomer	ethene	styrene	propene	chloroethene
Polymer	poly(ethene)	poly(styrene)	poly(propene)	poly(chloroethene)

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The structure of a polymer can be drawn given either the structure of the monomer or the repeating unit

- A repeating unit is the shortest section of polymer chain which, if repeated, would yield the complete polymer chain (except for the end-groups)
- From the structure of a polymer, the monomer or repeating unit can be drawn.

Monomer:
propene

$$\begin{array}{ccccccc}
 \text{CH}_3 & \text{H} & & \text{CH}_3 & \text{H} & & \text{CH}_3 & \text{H} \\
 | & | & & | & | & & | & | \\
 \text{C} & = & \text{C} & + & \text{C} & = & \text{C} & + & \text{C} & = & \text{C} \\
 | & | & & | & | & & | & | \\
 \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{H}
 \end{array}$$

addition polymerisation

Polymer:
poly(propene)

$$\begin{array}{ccccccc}
 \text{CH}_3 & \text{H} & & \text{CH}_3 & \text{H} & & \text{CH}_3 & \text{H} \\
 | & | & & | & | & & | & | \\
 -\text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - \\
 | & | & & | & | & & | & | \\
 \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{H}
 \end{array}$$

$$\left[\begin{array}{c} \text{CH}_3 \text{ H} \\ | \quad | \\ \text{C} - \text{C} \\ | \quad | \\ \text{H} \quad \text{H} \end{array} \right]$$

repeating unit