Exercise walk-through

Polymers ▪ 11.8

eXercise

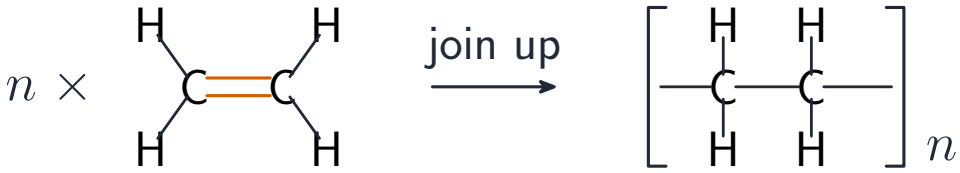
You must be able to

- describe addition polymerisation and draw a repeat unit
- compare addition with condensation polymerisation (polyamides, polyesters)
- discuss the disposal problems of plastics

Method — Addition polymerisation

- **monomer:** small unit; **polymer:** the long chain; **repeat unit:** the part that repeats.
- **condensation:** monomers join and a small molecule (water) is lost — polyamides (nylon), polyesters (PET).

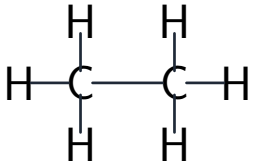
Method — Addition polymerisation



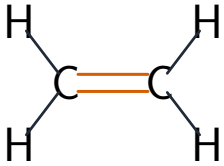
ethene (monomer) poly(ethene) repeat unit

Ethene monomers (C=C) joining into a poly(ethene) chain

Method — Addition polymerisation



ethane C_2H_6
saturated: single C–C bond



ethene C_2H_4
unsaturated:
C=C double bond

Addition polymers form from unsaturated monomers

Practice 2.1 ▪ 1 mark

Define a polymer.

Solution 2.1

Worked steps

a very large molecule made from many small molecules (monomers) joined together B1.

Practice 2.2 ▪ 1 mark

Name the monomer used to make poly(ethene).

Solution 2.2

Method: Addition polymerisation

Worked steps

ethene B1.

Exam-style 3.1 ▪ 1 mark

In addition polymerisation, the number of products formed is:

A one (the polymer only)

B two

C three

D none

Solution 3.1

Method: Addition polymerisation

A one (the polymer only) ✓

B two

C three

D none

Worked steps

A. Addition polymerisation makes only the polymer (no other product).

Exam-style 3.2 ▪ 1 mark

Poly(ethene) is made from ethene.
(a) State what happens to the C=C double bonds during polymerisation.
(b) Draw the repeat unit of poly(ethene).

Solution 3.2

Method: Addition polymerisation

Worked steps

(a) the double bonds open up so the monomers can join together **B1**.

(b) $-(CH_2 - CH_2)-$ shown in brackets with the continuation bonds **M1** **A1**.

Exam-style 3.3 ▪ 2 marks

Many plastics are not biodegradable. State two problems this causes for the environment.

Solution 3.3

Worked steps

any two of: they build up in landfill; they collect in oceans and harm sea life; burning them releases toxic gases B1 B1.