

20.1 Addition polymerisation

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS repeat unit 重复单元 • monomer 单体 • addition polymerisation 加成聚合 • polymer 聚合物
 • non-biodegradable 不可生物降解

Objective

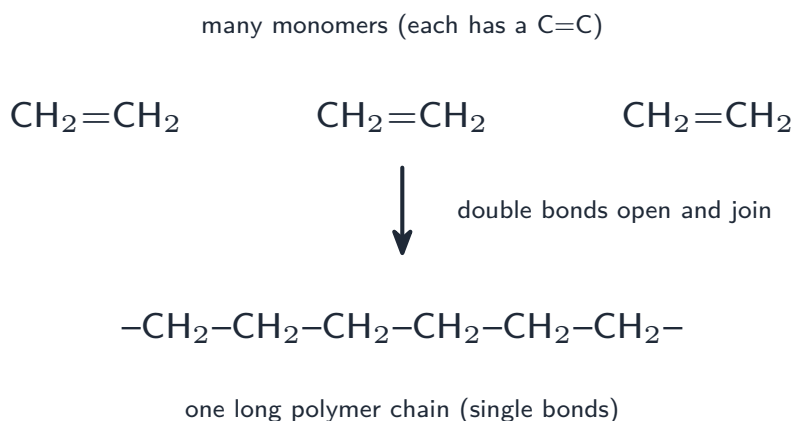
Build the skills to answer exam questions on **addition polymerisation** 加成聚合 — drawing **repeat units** 重复单元, finding **monomers** 单体, and the problems of disposal.

You must be able to:

- describe addition polymerisation (poly(ethene), PVC)
- deduce the repeat unit from a monomer, and the monomer from a polymer
- explain the difficulty of disposing of poly(alkene)s

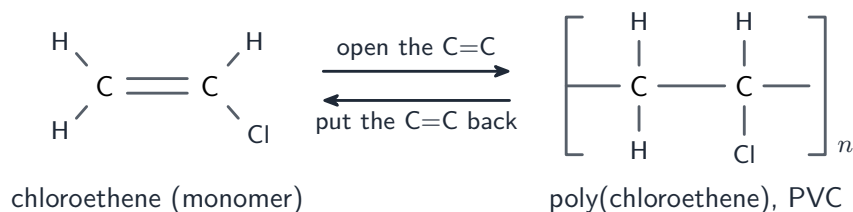
1 Worked examples

■ Addition polymerisation



Many unsaturated monomers join into one long chain, with no other product

■ Repeat unit and monomer

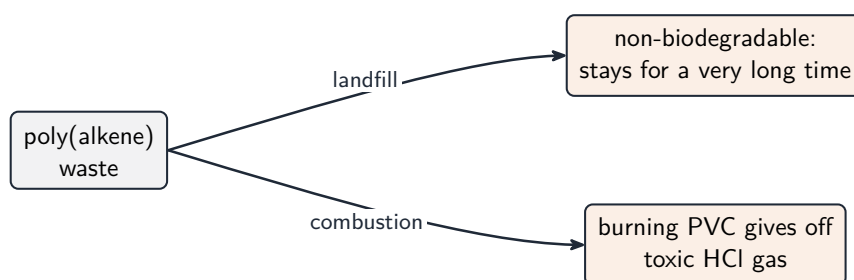


Repeat unit: change the monomer's C=C to a single bond and draw bonds out at each end



To find the **monomer** from a polymer: take one repeat unit and put the C=C back.

■ Disposal



*Poly(alkene)s are **non-biodegradable** and their combustion can release harmful gases (e.g. PVC gives toxic HCl)*

2 Practice

2.1 State what is meant by the **repeat unit** of a polymer.

[1]

2.2 State **two** problems of disposing of poly(alkene)s.

[2]

3 Exam-style questions

3.1 Which feature must a monomer have to undergo addition polymerisation? [1]

- **A** an -OH group
 - **B** a $\text{C}=\text{C}$ double bond
 - **C** a benzene ring
 - **D** an ionic bond
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3.2 Burning PVC is a particular problem because it releases: [1]

- **A** carbon dioxide only
 - **B** toxic hydrogen chloride
 - **C** water vapour
 - **D** nitrogen
-

3.3 Propene is $\text{CH}_3\text{CH}=\text{CH}_2$.

(a) Draw the repeat unit of poly(propene). [2]

(b) A section of a polymer is $\text{-(CH}_2\text{CHCl)}_n\text{-}$. Draw the monomer it was made from. [1]

3.4 Explain why addition polymers are described as non-biodegradable. [2]

Solutions

2.1 the small part that is repeated again and again along the polymer chain.

2.2 non-biodegradable (microbes cannot break them down); combustion releases harmful/toxic gases.

3.1 B. The monomer needs a C=C double bond.

3.2 B. Burning PVC releases toxic hydrogen chloride.

3.3 (a) $-(\text{CH}_2\text{CH}(\text{CH}_3))_n-$ drawn with bonds out at each end.
(b) chloroethene, $\text{CH}_2=\text{CHCl}$.

3.4 the C–C backbone is strong and unreactive, so microbes/enzymes cannot break it down, and it persists in the environment.