

35.2 Predicting the type of polymerisation

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS addition polymerisation 加成聚合 • condensation polymerisation 缩合聚合
• monomer 单体 • repeat unit 重复单元 • polyester 聚酯

Objective

Build the skills to answer exam questions on **predicting the type of polymerisation** 判断聚合类型 — telling **addition** 加成聚合 from **condensation** 缩合聚合 from the monomer and the product.

You must be able to:

- use the monomer's structure to predict the polymerisation type
- recognise addition ($C=C$, nothing lost) vs condensation (two groups, small molecule lost)

1 Worked examples

■ Which type?

addition polymerisation

- monomer has a **$C=C$**
 - the double bond opens and the monomers join
 - **nothing else** is lost
- e.g. ethene $\rightarrow$ poly(ethene)

condensation polymerisation

- each monomer has **two** functional groups
 - a **small molecule** (H_2O or HCl) is lost
 - ester or amide links form
- e.g. a polyester or polyamide

Addition opens a $C=C$ and loses nothing; condensation joins two-group monomers and loses a small molecule

polyester (ester links)



break each link; add back $-\text{OH}$ and $-\text{H}$



diol



dicarboxylic acid

Find the monomers to predict the polymerisation type

Clue	Type
monomer has a $\text{C}=\text{C}$, nothing else lost	addition
each monomer has two functional groups; a small molecule is lost;	condensation
chain has ester/amide links	

2 Practice

2.1 State the type of polymerisation when ethene forms poly(ethene). [1]

2.2 State the type of polymerisation when a small molecule is lost at each link. [1]

3 Exam-style questions

3.1 A monomer with **one** $\text{C}=\text{C}$ and no other functional group will undergo: [1]

A	B
C	D

A addition polymerisation

B condensation polymerisation

C neither

D hydrolysis

3.2 Which observation shows that a polymer formed by **condensation**? [1]

A	B
C	D

A the monomer had a C=C

B no small molecule was lost

C water (or HCl) was released and the chain has ester/amide links

D the polymer is an alkene

3.3 For each monomer, predict the type of polymerisation and justify it: [3]

(a) $\text{CH}_2=\text{CHCl}$ (chloroethene)

(b) $\text{HOCH}_2\text{CH}_2\text{OH} + \text{HOOC}(\text{CH}_2)_4\text{COOH}$

(c) a single amino acid $\text{H}_2\text{NCH}_2\text{COOH}$

3.4 Explain how you could tell, from the **product** alone, whether a polymer was made by addition or condensation. [2]
