

35.3 Degradable polymers

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS biodegradable 可生物降解 • hydrolysis 水解 • poly(alkene) 聚烯烃
• degradable polymers 可降解聚合物 • polyester 聚酯

Objective

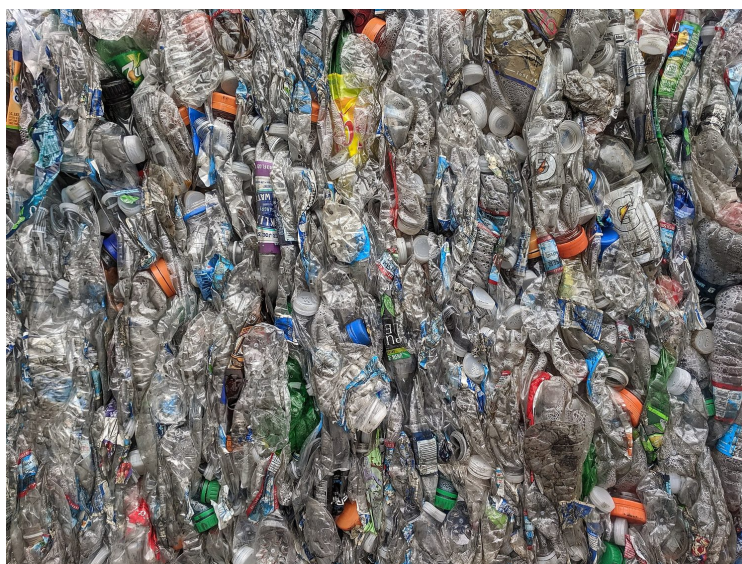
Build the skills to answer exam questions on **degradable polymers** 可降解聚合物 — why poly(alkene)s last so long, and why polyesters and polyamides can be broken down.

You must be able to:

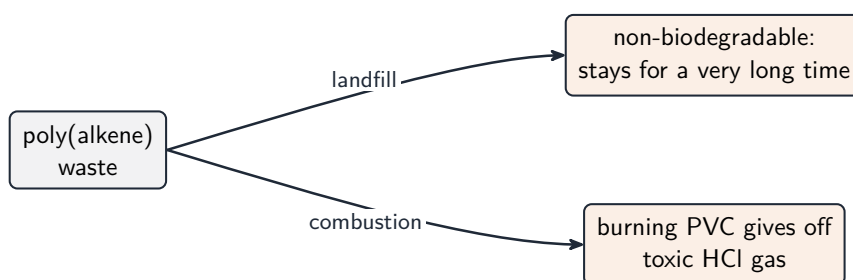
- explain why poly(alkene)s are hard to biodegrade
- explain why polyesters and polyamides are biodegradable
- describe how hydrolysis breaks the links

1 Worked examples

■ Why some polymers degrade and others do not



PET bottles are a polyester — a condensation polymer whose ester links can be hydrolysed, so it can be broken down and recycled



Degradable polymers break down on disposal

- **poly(alkene)s** (e.g. poly(ethene)): only strong, non-polar C–C and C–H bonds → chemically inert → hard to **biodegrade**, last a long time.
- **polyesters** / **polyamides**: have **ester** or **amide** links → these can be broken by acidic or alkaline **hydrolysis** → biodegradable.
- some polymers are made **photodegradable** (light breaks them down).

2 Practice

2.1 State why poly(ethene) is hard to biodegrade. [1]

2.2 Name the reaction that breaks the links in a polyester. [1]

3 Exam-style questions

3.1 Poly(alkene)s are hard to biodegrade because they contain only: [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** polar ester links
B amide links
C strong, non-polar C–C and C–H bonds
D C=C double bonds

3.2 A polyester can be broken down by: [1]

- | | |
|---|---|
| A | B |
| C | D |
- A** addition
B hydrolysis of the ester links
C combustion only
D none of these

3.3 Explain why a polyamide is biodegradable but poly(propene) is not. [3]

3.4 Suggest **one** environmental advantage of replacing a poly(alkene) packaging with a polyester. [1]
