

Exercise walk-through

Introduction to Macromolecules ■ 1.3

eXercise

You must be able to

- describe **polymers** 聚合物 built from **monomers** 单体
- explain **dehydration synthesis** 脱水缩合 and **hydrolysis** 水解
- name the four classes of biological macromolecule

Method — Monomers and polymers

Large biological molecules (**macromolecules**) are **polymers** — long chains of repeating subunits called **monomers**. The four classes are carbohydrates, lipids, nucleic acids, and proteins.

Method — Dehydration synthesis (building)

Cells join two monomers by **removing a water molecule** to form the bond — **dehydration synthesis** (condensation). Building a polymer removes one water per bond formed.

Method — Hydrolysis (breaking)

The reverse — **adding water** to break a bond between monomers — is **hydrolysis**.
Digestion breaks polymers into monomers by hydrolysis.

Method — A worked link

Two monosaccharides join by dehydration synthesis (losing water) to form a disaccharide; adding water (hydrolysis) splits it back into two monosaccharides.

Practice 2.1 ■ 1 mark

What is a polymer?

Solution 2.1

Worked steps

A long chain of repeating monomers **B1**.

Practice 2.2 ■ 1 mark

What is removed when two monomers join by dehydration synthesis?

Solution 2.2

Method: Dehydration synthesis (building)

Worked steps

A water molecule **B1**.

Practice 2.3 ■ 2 marks

Name the four classes of macromolecule.

Solution 2.3

Method: Monomers and polymers

Worked steps

Carbohydrates, lipids, nucleic acids, proteins **B1** **B1** *for two, for four.*

Exam-style 3.1 ■ 1 mark

Breaking a polymer into monomers by adding water is called

A dehydration synthesis

B hydrolysis

C condensation

D denaturation

Solution 3.1

Method: Hydrolysis (breaking)

A dehydration synthesis

B hydrolysis



C condensation

D denaturation

Worked steps

B — hydrolysis.

Exam-style 3.2 ■ 2 marks

A cell links many glucose monomers into a starch polymer.

- (a) Name the process and what is removed at each bond.
- (b) State how the starch could later be broken back into glucose.

Solution 3.2

Method: Dehydration synthesis (building)

Worked steps

(a) Dehydration synthesis; a water molecule is removed at each bond **M1 A1**. (b) By hydrolysis — adding water to break the bonds back into glucose **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain why dehydration synthesis and hydrolysis are described as opposite processes.

Solution 3.3

Method: A worked link

Worked steps

Dehydration synthesis **removes** water to form a bond and build a polymer; hydrolysis **adds** water to break the bond — each reverses the other **M1 A1**.