

# 1.3 Introduction to Macromolecules

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_ **Total: 11 marks**

**KEY WORDS** monomers 单体 • hydrolysis 水解 • dehydration synthesis 脱水缩合  
• polymers 聚合物 • nucleic acids 核酸

## Objective

Build the skills to answer exam questions on **macromolecules** — polymers, monomers, and how they are built.

**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

## 1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

### ■ 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.

### ■ 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.

### ■ Hydrolysis (breaking)

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

### ■ A worked link

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

## 2 Practice

Now apply the methods above.

**2.1** What is a polymer? [1]

\_\_\_\_\_

**2.2** What is removed when two monomers join by dehydration synthesis? [1]

\_\_\_\_\_

**2.3** Name the four classes of macromolecule. [2]

\_\_\_\_\_

\_\_\_\_\_

## 3 Exam-style questions

**3.1** Breaking a polymer into monomers by adding water is called [1]

- **A** dehydration synthesis
- **B** hydrolysis
- **C** condensation
- **D** denaturation

\_\_\_\_\_

**3.2** A cell links many glucose monomers into a starch polymer.

(a) Name the process and what is removed at each bond. [2]

(b) State how the starch could later be broken back into glucose. [2]

**3.3** Explain why dehydration synthesis and hydrolysis are described as opposite processes. [2]

## Solutions

---

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

**2.2** A water molecule.

**2.3** Carbohydrates, lipids, nucleic acids, proteins.

**3.1 B** — hydrolysis.

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

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