

2 Biological molecules – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
carbohydrates	_____	_____	_____
lipids	_____	_____	_____
proteins	_____	_____	_____
molecule	_____	_____	_____
reducing sugar	_____	_____	_____
starch	_____	_____	_____
biuret	_____	_____	_____
emulsion	_____	_____	_____
monomer	_____	_____	_____
polymer	_____	_____	_____
monosaccharide	_____	_____	_____
glucose	_____	_____	_____
disaccharide	_____	_____	_____
maltose	_____	_____	_____
polysaccharide	_____	_____	_____

English**Write it 3 times** (English)

glycosidic bond

condensation

hydrolysis

amylose

amylopectin

glycogen

cellulose

cell wall

insoluble

Recall

You met these ideas at IGCSE. Bring them with you:

- Living things contain **carbohydrates** , **lipids** , **proteins** and water.
- You used food tests before – the iodine test for starch, and Benedict’s test for sugar.
- “Big molecules are built from small ones” – that simple idea runs through this whole sheet.

Nothing here is harder than IGCSE. It just lines up the chemistry the AS course starts with.

New ideas

Read these first. Each has a short worked example. Then do the Practice below.

■ 1 Four food tests

A **molecule** is a group of atoms joined together. Simple tests show which kinds are present in a sample.

Test	Finds	Positive result
Benedict's test	reducing sugar	blue → green → orange → brick-red
iodine test	starch	orange-brown → blue-black
biuret test	protein	blue → purple
emulsion test	lipid	white cloudy emulsion

Worked example. You add Benedict's solution to a juice and heat it. It turns brick-red. So the juice contains a reducing sugar.

■ 2 Monomers and polymers

- a **monomer** is a small single unit.
- a **polymer** is a long molecule made of many monomers joined up.

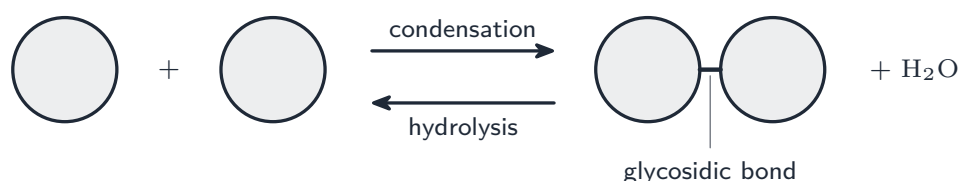
Sugars come in three sizes:

- a **monosaccharide** is one sugar unit, such as **glucose**.
- a **disaccharide** is two units joined, such as **maltose**.
- a **polysaccharide** is many units joined into a polymer.

■ 3 Joining and breaking (condensation and hydrolysis)

When two monomers join, a strong **glycosidic bond** forms and **one water molecule is removed**. This is **condensation**.

The reverse adds water to break the bond. This is **hydrolysis**.



Worked example. Sucrose + water → glucose + fructose. Adding water breaks one bond, so this is hydrolysis.

■ 4 Storage and structure polysaccharides

All three are polymers of glucose, but their **shape fits their job**:

- **starch** is the store in plants – made of a coiled chain (**amylose**) and a branched chain (**amylopectin**).

- **glycogen** is the store in animals – like amylopectin but **more branched**, so it breaks down fast.
- **cellulose** is made of straight chains held side by side; they pack into strong fibres that build the plant **cell wall**.

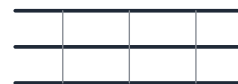
Stores like starch and glycogen are useful because they are compact and **insoluble** (so they stay in the cell).



amylose (coiled)



glycogen (branched)



cellulose (straight)

Watch out: condensation *removes* water (joining monomers); hydrolysis *adds* water (breaking them apart). Starch, glycogen and cellulose are *all* glucose polymers – it is their different *shapes* that suit their different jobs.

Practice

Try these in order. The methods are all above.

2.1 Name the test for (a) starch, (b) protein, (c) a reducing sugar. [3]

2.2 A sample turns Benedict's solution brick-red. What does this tell you? [1]

2.3 Define (a) a monomer, (b) a polymer. [2]

2.4 Two monosaccharides join to form a disaccharide. (a) Name the bond formed. (b) Name this type of reaction. (c) What small molecule is removed? [3]

2.5 Glycogen and cellulose are both polymers of glucose, but do different jobs. State one use of each. [2]

2.6 Explain why starch is a good storage molecule in a cell. [2]

2.7 Challenge. Cellulose and starch are both made only of glucose, yet cellulose builds strong cell walls while starch is a store. Explain how their different structures suit these different jobs. [2]
