

# Biological Molecules

## IGCSE Biology ■ Topic 4

IGCSE Biology



# What we will cover

- 1 Elements in food
- 2 Building large molecules
- 3 Food tests
- 4 Test colours
- 5 The structure of DNA



base pairs

*the structure of DNA*

# Elements in food

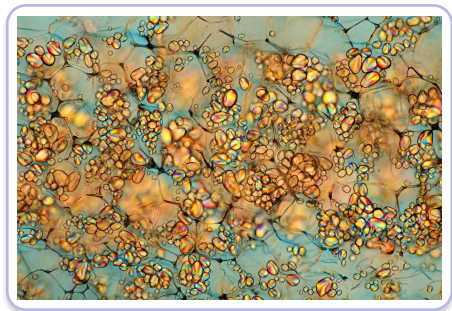
carbohydrates  
and fats  
**C H O**

proteins  
**C H O N**



*Food is a source of energy and materials*

# Building large molecules



*Starch stores carbohydrate in plants*

# Food tests

| Food substance<br>(test)                    | start                                                                             | positive result                                                                                |
|---------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>Starch</b><br>(iodine)                   |  |  blue-black   |
| <b>Reducing sugar</b><br>(Benedict's, heat) |  |  brick-red    |
| <b>Protein</b><br>(biuret)                  |  |  purple       |
| <b>Fat</b><br>(ethanol emulsion)            |  |  cloudy white |
| <b>Vitamin C</b><br>(DCPIP)                 |  |  colourless   |

Add a test chemical & watch the colour (**biuret** 双缩脲 for protein, an **emulsion** 乳浊液 for fat).

Only **Bene-**  
**dict's** 本尼迪特试剂 needs  
**heat**. DCPIP goes **colourless**;  
the others gain a colour.

# Test colours

**starch**  
**iodine → blue-black**

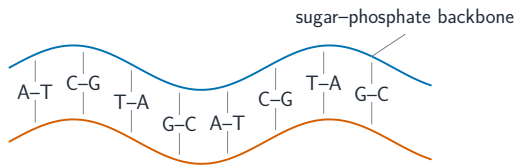
**reducing sugar**  
**Benedict's → brick-red**

**protein**  
**biuret → purple**

**fat**  
**emulsion → cloudy**

**vitamin C**  
**DCPIP → colourless**

# The structure of DNA



two strands form a double helix; bases pair A-T and C-G

**DNA** 脱氧核糖核酸 is a **double helix** 双螺旋 – a twisted ladder of two **strands** 链.

The **bases** 碱基 always pair: **A-T** and **C-G**. So one strand sets the other.

## Worked example – reading food tests

A food gives a brick-red Benedict's result and a purple biuret result, but iodine stays orange-brown. What is in it?

- Benedict's brick-red  $\Rightarrow$  **reducing sugar present**, and a lot of it.
- Biuret purple  $\Rightarrow$  **protein present**.
- Iodine **stays** orange-brown  $\Rightarrow$  **no** starch (blue-black would mean starch).
- So: **reducing sugar + protein, no starch**.

Learn the colour **change**, not just the final colour: Benedict's blue  $\rightarrow$  brick-red (heat needed), iodine orange-brown  $\rightarrow$  blue-black, biuret blue  $\rightarrow$  purple.



## Topic 4 – key takeaways

1

### Elements

carbs & fats C,H,O; proteins add N

2

### Big molecules

chains of glucose / amino acids / fatty acids

3

### Food tests

iodine, Benedict's (heat), biuret, DCPIP

4

### DNA

double helix; A–T & C–G

## Check yourself

- 1 Which element do proteins have that fats do not?
- 2 What are proteins built from?
- 3 Which food test needs heating?
- 4 Which base pairs with C in DNA?



**Answers** 1. nitrogen 2. amino acids 3. Benedict's (reducing sugars) 4. G