Your notes

GCSE Biology: revision notes

Digestion and the digestive system

Contents

1. Start here: why food has to be digested
2. The digestive system
3. Digestive enzymes
4. Bile
5. Using the products of digestion
6. Required practical: food tests
7. Exam tip
8. Common mistakes
9. Key terms
10. Quick questions
11. What to do next

Start here: why food has to be digested

- Most of the food you eat is large molecules (starch, proteins and fats) that are too big to pass through the wall of your gut into your blood.
- **Digestion** breaks them into small, soluble molecules that can be absorbed: starch into sugars, proteins into amino acids, and fats (lipids) into fatty acids and glycerol.
- Enzymes do the breaking down, and each enzyme works on one kind of food molecule.

The digestive system

- The digestive system is an organ system that breaks down large, insoluble food molecules into small, soluble ones that can be absorbed into the blood.
- Salivary glands make saliva containing **amylase**. The stomach churns food and makes hydrochloric acid and **protease** (pepsin).
- The pancreas makes **carbohydrase**, **protease** and **lipase**, which it releases into the small intestine.
- The small intestine makes more enzymes and absorbs digested food through its **villi**. The large intestine absorbs water.
- The liver makes **bile**, which is stored in the gall bladder.

Digestive enzymes

- **Carbohydrases** break down carbohydrates into simple sugars. **Amylase** breaks down starch into sugars.

- **Proteases** break down proteins into amino acids.
- **Lipases** break down lipids (fats and oils) into fatty acids and glycerol.
- **Amylase** is made in the salivary glands, pancreas and small intestine; **protease** in the stomach, pancreas and small intestine; **lipase** in the pancreas and small intestine.

Bile

- **Bile** is alkaline, so it neutralises hydrochloric acid from the stomach. This gives the right pH for enzymes in the small intestine.
- **Bile** emulsifies fat into small droplets, which increases the surface area for **lipase** to work on.
- **Bile** is made in the liver and stored in the gall bladder before being released into the small intestine.

Using the products of digestion

- The small, soluble products are absorbed into the blood and used to build new carbohydrates, lipids and proteins.
- Some glucose is used in respiration to release energy.

Required practical: food tests

- Starch: add iodine solution; it turns from orange-brown to blue-black.
- Reducing sugars (such as glucose): add Benedict's solution and heat in a water bath at about 75 °C; it turns from blue to green, yellow or brick red.
- Protein: add Biuret solution; it turns from blue to purple (lilac).
- Lipids: add Sudan III stain and shake; a red-stained oily layer forms on top.
- Grind food with water and filter it first to make a solution to test.

Exam tip

- Learn each enzyme with what it breaks down and what it makes: **amylase**, starch to sugars; **protease**, proteins to amino acids; **lipase**, lipids to glycerol and fatty acids.
- Know each food test and its colour change: Benedict's needs heating, and turns from blue to brick red.

Common mistakes

- Calling **bile** an enzyme. It emulsifies fats and neutralises stomach acid.
- Mixing up **digestion** (breaking food down) with absorption (taking it into the blood).

Your notes

Key terms

Digestion	Breaking down large, insoluble food molecules into small, soluble ones.
Carbohydrase	An enzyme that breaks down carbohydrates into simple sugars.
Amylase	A carbohydrase that breaks down starch into sugars.
Protease	An enzyme that breaks down proteins into amino acids.
Lipase	An enzyme that breaks down lipids into fatty acids and glycerol.
Bile	An alkaline liquid made by the liver that neutralises stomach acid and emulsifies fats.
Emulsify	To break fat into small droplets, increasing its surface area.
Villi	Finger-like projections in the small intestine that absorb digested food.
Benedict's test	A test for reducing sugars: heated with Benedict's solution, a positive result turns green, yellow or brick red.
Biuret test	A test for protein: a positive result turns the blue solution purple.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which enzyme breaks down starch?
2. What are proteins broken down into?
3. What are lipids broken down into?
4. Where is bile made?
5. How does bile help lipase?
6. Why is bile alkaline?
7. Which organ makes carbohydrase, protease and lipase?
8. What is the test for protein?

Answers

1. Amylase
2. Amino acids
3. Fatty acids and glycerol
4. Liver
5. It emulsifies fat into small droplets, increasing surface area
6. To neutralise acid from the stomach
7. Pancreas
8. Biuret solution turns purple

Your notes

What to do next

Practise 12 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

Your notes