

Knowledge Organiser: Y8 Digestion

Nutrients

The body needs a balance of nutrients to stay healthy. There are five groups of nutrients.

Macronutrients: macro simply means large or whole. Macronutrients need to be eaten in larger quantities than micronutrients.

	Purpose	Examples
Carbohydrates	Source of energy. Divided into: simple carbohydrates – sugars and complex carbohydrates – starches.	Bread, pasta, rice and potatoes.
Proteins	Provide materials to make new cells and to repair damaged tissues, such as muscles.	Animal products such as meat, fish, dairy. Plants such as lentils, nuts, seeds.
Fats (lipids)	Source of energy. Provide insulation (keep humans warm).	Oils, oily fish, nuts, dairy, fatty meats.

Micronutrients: micro simply means small. Micronutrients need to be eaten in smaller quantities than macronutrients but are absolutely essential to health.

	Purpose	Examples
Vitamins	Essential for many processes, e.g. bone growth/strength, nervous system, red blood cells, immune system. Need small amounts only.	Calcium – milk, canned fish, broccoli; iron – watercress, brown rice, meat; zinc – shellfish, cheese, wheatgerm; potassium – fruit, pulses, white meat.
Minerals	Essential for many processes, e.g. bone growth, metabolic rate, immune system, vision, nervous system. Need small amounts only.	A – dairy, oily fish, yellow fruit; B – vegetables, wholegrain cereals; C – citrus fruit, broccoli, sprouts; D – oily fish, eggs, fortified cereals.

Testing for Nutrients

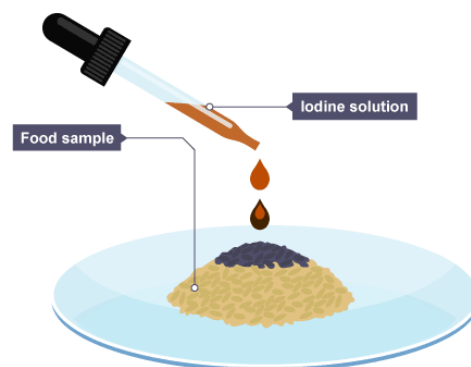
There are different tests which can be used to detect carbohydrates, proteins and lipids.

They involve adding a reagent to a food sample which changes colour depending on what biological molecules are present.

Sometimes it may be necessary to crush the food or add water to the food before adding the reagent.

Use Iodine Solution to Test for Starch

- 1) Make a food sample and transfer 5 cm³ to a test tube.
- 2) Add a few drops of iodine solution.
Gently shake the tube to mix the contents.
- 3) If the sample contains starch, the colour of the solution will change from brownly-orange to black or blue-black.



Use the Benedict's Test to Test for Sugars

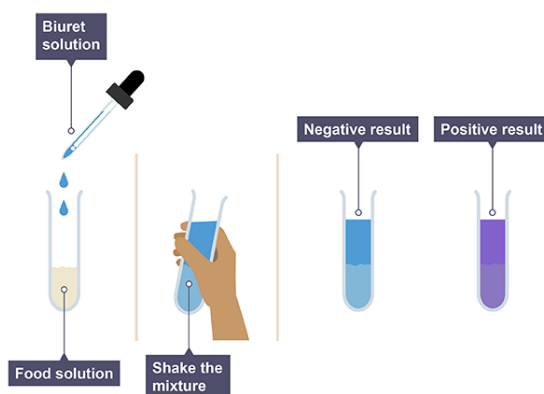
The Benedict's test is used to test for a type of sugar called a reducing sugar. Here's how you do it:

- 1) Prepare a food sample and transfer 5 cm³ to a test tube.
- 2) Prepare a water bath so that it's set to 75 °C.
- 3) Add some Benedict's solution to the test tube (about 10 drops) using a pipette.
- 4) Place the test tube in the water bath using a test tube holder. Leave it in there for 5 minutes.
- 5) If the food sample contains a reducing sugar, the solution in the test tube will change from the normal blue colour to green, yellow or brick-red. The colour change depends on how much sugar is in the food.

Glucose is a reducing sugar.

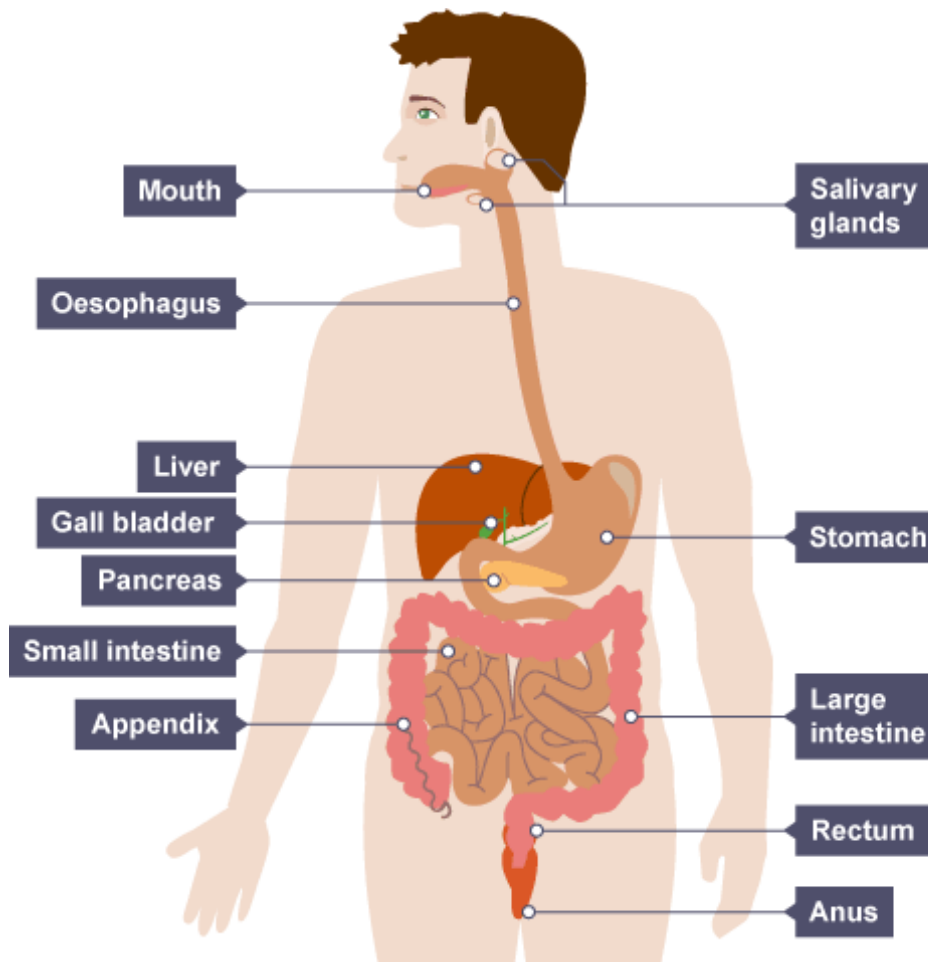
Use the Biuret Test to Test for Proteins

- 1) Prepare a sample of your food and transfer 2 cm³ to a test tube.
- 2) Add 2 cm³ of biuret solution to the sample. Mix the contents of the tube by gently shaking it.
- 3) If the food sample contains protein, the solution will change from blue to purple.



The Digestive System

Digestion turns large **insoluble** substances into small **soluble** ones. The organs of the **digestive system** help us digest food. Many of them produce **enzymes** (substances that are **catalysts** and help speed up the digestion of food).



Organ	Role in Digestion
Mouth	Teeth break down food into smaller pieces.
Salivary Gland	Produces saliva which moistens food and contains enzymes to help digest food.
Oesophagus	Has muscular walls that move food from the mouth to the stomach by an action called peristalsis.
Stomach	Has strong muscular walls that allow food to be mixed, also produces hydrochloric acid and enzymes. The acid kills harmful microbes and provides the optimum pH for stomach enzymes to work. The enzymes help to digest food.
Small Intestine	Food is absorbed into the blood in the small intestine. It has a very large surface area.
Large Intestine	Absorbs water which solidifies waste.
Rectum	The final section of the large intestine. Where waste is stored before being released.
Anus	A strong muscle that opens to release waste from the rectum.

Enzymes

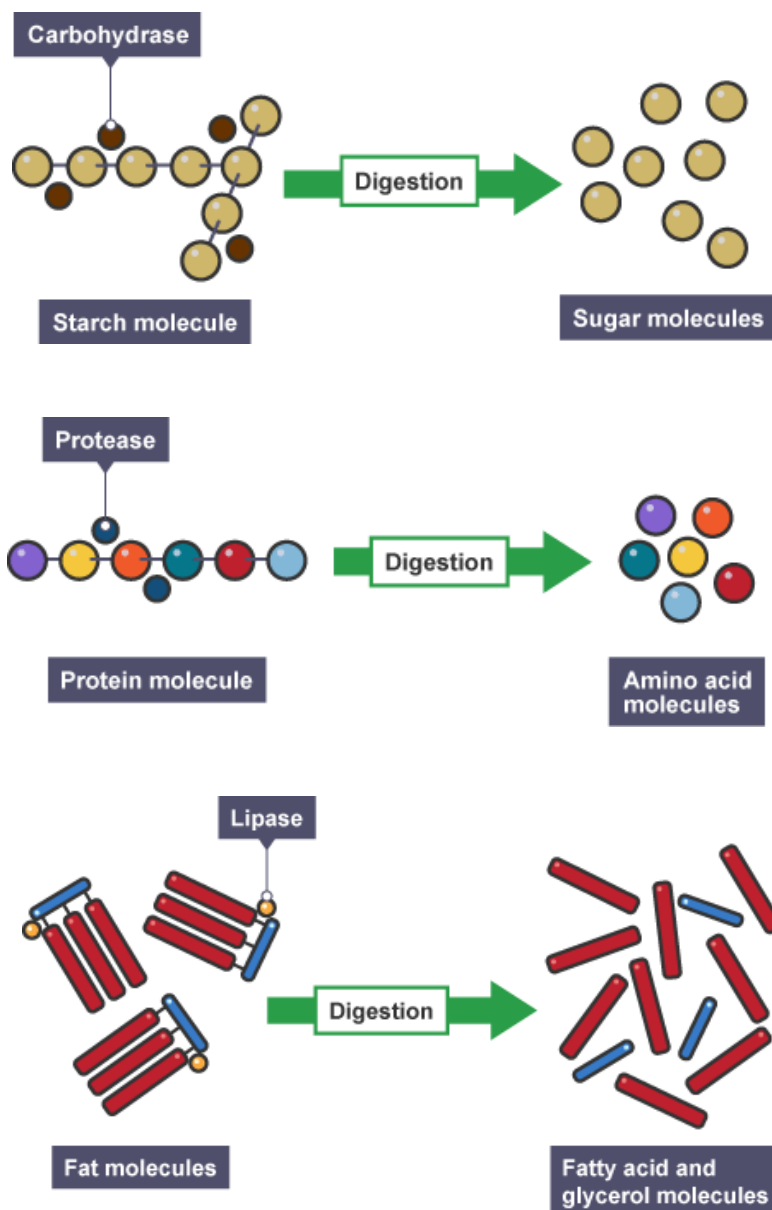
Food has to be broken down chemically into really small particles before it can be absorbed. Enzymes are the biological catalysts needed to make this happen quickly enough to be useful.

Enzymes are not living things. They are just special proteins that can break large molecules into small molecules. Different types of enzymes can break down different nutrients:

amylase and other carbohydrase enzymes break down **starch** into **sugar**

protease enzymes break down **proteins** into **amino acids**

lipase enzymes break down **lipids** (fats and oils) into **fatty acids** and **glycerol**



Absorption of Food

Digested food molecules are absorbed in the small intestine. This means that they pass through the wall of the small intestine and into our bloodstream. Once there, the digested food molecules are carried around the body to where they are needed.

Only small, soluble substances can pass across the wall of the small intestine. Large insoluble substances cannot pass through.

The Villi Provide a Really Big Surface Area

- 1) The inside of the small intestine is covered in millions of villi.
- 2) They increase the surface area so that digested food is absorbed more quickly into the blood.
- 3) They have:
 - a single layer of surface cells,
 - a very good blood supply.

