

Title: Protein digestion and enzymes

Subject Area: Biology

Key Stage 3

NC link: Sc3/2h, Sc2-nutrition.

Learning Objective:

- Children use copper sulphate solution and sodium hydroxide to test for protein in egg white.
- Children learn how enzymes break down protein into amino acid, this aiding digestion.
- Children investigate digestive enzymes by using trypsin and sodium hydrogen-carbonate solution with egg white.

Resources:

- For demonstration; copper sulphate solution, test tube, egg white, sodium hydroxide solution.
- For investigation (per group or individually); 2 test tubes, trypsin, some hard boiled egg white, water bath, thermometer, sodium hydrogen-carbonate solution.
- Photocopies of the Proteins sheet or OHP.

Starter

Look at a hard boiled egg, separate the yolk from the white and discuss the protein in the egg white and fat content of the yolk (Also vitamins and minerals). Using a raw egg demonstrate the test for protein by adding a few drops of copper sulphate solution to the test tube, Carefully add a few drops of sodium hydroxide solution. The protein turns purple.

Main Teaching Activity:

Explain that in this lesson you will be looking at enzymes; how they aid digestion in our bodies and more specifically how we use them to break down proteins. Use the Proteins sheet to explain how protease is used to aid digestion of protein (either as an OHP or photocopies).

Now introduce the Trypsin and Egg white experiment;

- Label 2 test tubes, A and B.
- Put 2ml of trypsin and 2ml of sodium hydrogen- carbonate into each tube.
- Cut 2X0.5cm cubes of egg white. Chop up one of the cubes into small pieces.
- Put the uncut cube into test tube A and the chopped up cube into tube B. Stir gently.
- Stand both test tubes in a water bath at 40 C.
- Every 5 minutes observe both tubes, look for signs of digestive activity.

Plenary

- Discuss the results that you found and the timings of the enzymes working with the protein. Suggest improvements on further tests- perhaps use of a control.

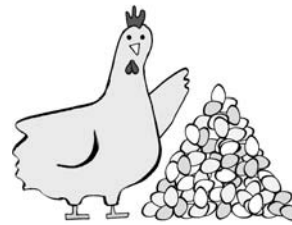
Differentiation

The enzyme experiment could lead well into the biology coursework where the effects that temperature, concentration of the enzymes and pH levels of enzymes could be explored. Explore different sorts of enzymes.

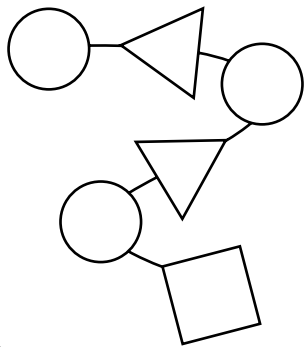
Special Notes:

Be very careful with sodium hydroxide it is corrosive- eye goggles.

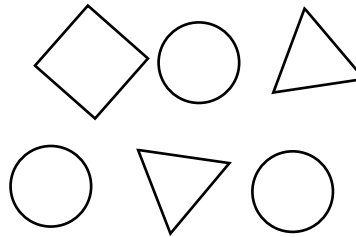
Proteins



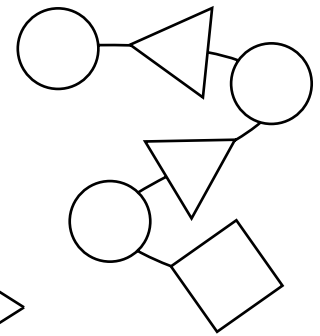
Proteins are made up of chains of amino acids.



When they are digested they are split up into single amino acids.



The body makes new proteins with the amino acids.



digestion

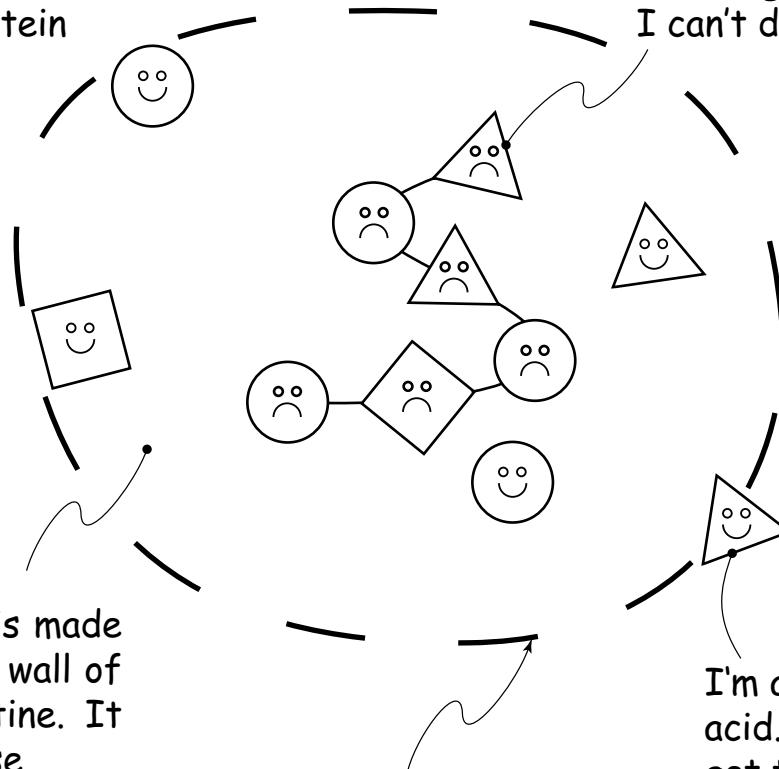
absorption

the breakdown of large food molecules to small food molecules using enzymes.

when the food has been digested it is absorbed through the wall of the gut into the blood.

the enzyme protease breaks down protein molecules

I'm a big protein molecule. I can't dissolve.



intestinal juice is made by glands in the wall of the small intestine. It contains protease.

a section of the gut

I'm a small single amino acid. I can dissolve and get through the wall.