

Name:	Date:
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Experiment: Proteins in Food

Evidence of proteins in food (biuret reaction)

Equipment

Hotplate, beakers, test tube rack, spatula, test tube plug

Materials

Food products: chicken egg, milk, yoghurt, quark, sugar, tofu, diet powder (e.g. Slim Fast) or food products for athletes, soy milk

Reagents: table salt, 5 % copper sulfate solution (5 g in 100 mL), sodium carbonate solution (10 g Na₂CO₃ in 100 mL water)

Safety and disposal guidelines

Sodium carbonate solution: irritant, Xi, R 36, S 22-26

Copper sulfate solution: environmentally hazardous, R 52/53, S 61

Do not dispose of solutions through the drain, but collect them in a waste bottle.

Introduction

Protein is an important nutrient for us. Proteins fulfil vital tasks in the human body. Not only chicken eggs, but many other food products also contain protein. In this experiment, we want to use a colour reaction to detect protein. In a strongly alkaline environment, protein reacts with copper sulfate and adopts a characteristic colour.

Experiment

One or two pupils can prepare the egg-white solution as the prepared volume is sufficient for the whole group.

1. Preparation of a saline egg-white solution

Add 15 g (about 3 teaspoons) of table salt to 150 mL of water and stir well until the salt is completely dissolved. Separate egg white and yolk. Add the egg white to the salt solution and stir well.

In order to become familiar with how to detect these substances, start with a comparative sample.

2. Comparative sample: Detecting protein using the biuret reaction

- Add about 1-2 mL of the saline egg-white solution to a test tube (ca. 1-2 cm high) and then add a splash of copper sulfate solution.
- Now add five splashes of sodium carbonate solution and shake the solution carefully (if necessary with a plug on the test tube).
- Remove the plug and put the test tube carefully in a water-filled beaker that is heated on a hotplate to a point short of boiling (at least 5 min).

Observations

3. Analysis of food products using the biuret reaction

Prepare the experiment by

- putting some quark into a test tube
 - pouring about 3 mL of milk into a test tube (ca. 3 cm high)
 - putting some yoghurt into a test tube
 - pouring some sugar into a test tube
 - pouring about 3 mL of soy milk into a test tube
 - putting some tofu into a test tube
 - pouring some diet powder or athletes' food into a test tube.
- Add some water to the solid and pasty samples. Each test tube should be filled one-third of the way full with the respective samples. The liquid samples can be analysed directly.
 - Carefully shake the test tubes.
 - Now add a splash of copper sulfate solution. Then add five splashes of sodium carbonate solution and shake the solution carefully (if necessary with a plug on the test tube).
 - Remove the plug and put the test tube carefully in a water-filled beaker that is heated on a hotplate to a point short of boiling (at least 5 min).
 - Observe closely what happens!

Sample	Observation
Quark	
Milk	
Yoghurt	
Sugar	
Tofu	
Diet powder	
Soy milk	

Which products contain protein?
