



Title

What Happens to the Proteins in Floating Island Desert?

Author

Jasminka Nađ, chemistry teacher

Table of activities

School subject	<i>Chemistry</i>
Topic	<i>Protein denaturation</i>
Age	<i>18 years</i>
Required time fo the activity	<i>90 minutes</i>
Required materials	<i>Egg whites, egg yolks, sugar, milk, heat source, containers</i>
Cultural concept	<i>Study of the chemical properties of the French desert</i>



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Teaching concept

The goal of this activity is to show the process of protein denaturation in the process of making the traditional French desert Floating Island when the primary structure of egg proteins is destroyed.

Cultural concept

It is believed that the origin of Floating Island desert is French, however this delicacy is also represented in other countries under different names.

Chemical concept

Mechanical denaturation of proteins in egg white and disruption of native protein function.

Aim of the activity

The goal of the activity is to apply students' chemistry knowledge to understand the processes that occur during food preparation. By studying the structure of proteins and the process of their denaturation different dishes can be prepared for example Floating Island. Denaturation of proteins can occur mechanically, due to temperature or by changing the pH. The preparation of this French delicacy is based on mechanical denaturation of the egg whites and cooking of the yolks.

Activities

This activity consists of the following steps:

The first step is to investigate the native structure of the protein, its significance, as well as protein structures. Students visually present a three-dimensional protein structure through a model or video.

The second step of this activity is to observe the proteins in the eggs and how the protein structure can be changed which is called denaturation. Students then explore the types of denaturations and the significance of denaturation, as well as what happens after protein denaturation. There are various examples of protein denaturation during food preparation, for example, when making cheese and yogurt or cooking an egg.

The third step of the activity is the mechanical denaturation of egg proteins, which is albumin from egg whites. Students use a mixer to make foam from egg whites. To determine if the denaturation process is complete, they turn the container upside down. If the mass remains

solid in it, and does not fall out, it means that the process is over. In this part, relying on their knowledge of chemistry, the students explain what happened to the proteins and why the egg white does not fall out of the bowl, i.e. why it is solid.

In the last step, the beaten egg whites are boiled in hot milk to complete the denaturation process. Then the egg yolks are mixed with sugar and flour. In this case, the flour has the role of a thickener because the starch reacts with water to swell. This is a way a thick mass is obtained. The whipped mixture is cooked in milk. Whipped and boiled egg whites are covered with yellow cream and the egg and milk dessert, called Floating Island, is ready.

The recipe that students use to prepare Floating Island requires 1 liter of milk, 4 eggs, 6 spoons of sugar, 2 bags of vanilla sugar, and 2 full spoons of flour. The egg yolks and whites are separated, and the egg whites are thoroughly beaten with a mixer. By turning the container upside down, check that the egg white is denatured. Whipped egg whites are taken out with a spoon and cooked in boiling milk until they start to rise. Then they are taken out and arranged on a plate. Then a yellow cream is prepared from egg yolks, sugar and flour and all this is added to hot milk. Cooked egg whites are poured over the cooked cream, and the dessert is left to cool.

Additional materials



Figure 1. Whipping the whites



Figure 2. Cooking the cream



Figure 3. Combining prepared content



Figure 4. Served Floating Island dessert