



Title

Milk-Acid Fermentation and Tasty

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Table of activities

School subject	<i>Chemistry</i>
Topic	<i>Ugljeni hidrati</i>
Age	<i>19 years</i>
Required time for activity	<i>180 minutes</i>
Required materials	<i>Milk, yogurt, cucumbers</i>
Cultural concept	<i>Making a traditional Greek specialty</i>



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Teaching concept

The goal of this activity is to learn about chemical process that takes place when yogurt is obtained from milk.

Teaching concept

Tzatziki is a milk-yogurt sauce that is common in the cuisines of Southeast Europe and the Middle East. It is especially popular in Greece. It is made from salted strained yogurt or diluted yogurt mixed with cucumbers, garlic, salt, olive oil, and sometimes vinegar or lemon juice, as well as herbs such as dill, mint, parsley, and thyme. It is usually served as a cold appetizer or side dish. Greek-style tzatziki is usually served with bread, fried eggplant or zucchini.

Chemical concept

*Fermentation of milk leads to the conversion of milk sugar into lactic acid. For example, yogurt is created by the natural process of fermentation of milk with the help of bacteria. Yogurt is a semi-liquid dairy product that contains 0.7% lactic acid. It is obtained by heating milk and adding lactic acid bacteria. These are bacteria called by their Latin names *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Then, at a temperature of 41-45 °C for 2 to 4 hours, fermentation and acidification of the milk occurs. During the action of bacteria, fermentation occurs, where milk sugar-lactose turns into lactic acid and this process is used for the industrial production of yogurt. After that, the yogurt is cooled, which slows down the acidification and prolongs its freshness.*

Yogurt can be easily prepared at home or in the classroom. It is necessary to heat the milk to 40-42 °C and add a little yogurt to it. For example, 2 liters of milk require 1 dl of yogurt. Then everything is mixed well and left covered in a warm place for 2 to 3 hours. After that, it should be put in the refrigerator. Strained yogurt, Greek yogurt, yogurt cheese, or cored yogurt are yogurts that have been strained to remove most of the whey, resulting in a thicker consistency than regular unstrained yogurt while still retaining the yogurt's characteristic sour flavor.

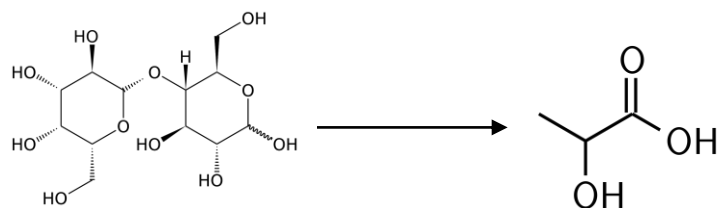
Aim of the activity

The goal of the activity is to learn about lactic-acid fermentation through the process of making yogurt.

Activities

This activity consists of the following steps.

The first step is to research the way in which the milk sugar-lactose in milk is converted into lactic acid by fermentation. During that student learn about the chemical process of obtaining yogurt. The notation of chemical reaction is:



The second step in the activity is the research of the process of obtaining the Greek type of yogurt, as its properties. The third step of the activity is to make Greek yogurt according to the recipe students find themselves.

In the last step, students research how to make traditional Greek Tzatziki sauce and make it according to the recipe they found using Greek yogurt they made themselves. The required materials are 2 long cucumbers, 4 cloves of garlic, half a bunch of dill, salt, 400ml of Greek yogurt, a little olive oil and white pepper.

Activities

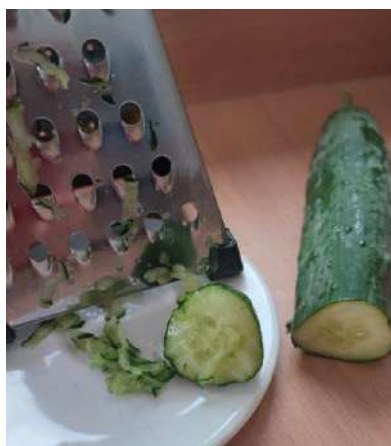


Figure 1. Preparing materials for Tzaziki



Figure 2. Served Tzaziki