

For teachers

Milk - Keep refrigerated

Objectives/Competences

Objectives. With this activity, students will:

1. To know the composition of milk and various kinds of milk.
2. To understand the role of acidity for the *precipitation/turning souer* of milk.
3. To examine the effect of temperature on the increase of the acidity of milk.
4. To prepare yogurt.
5. To know the importance of milk and yogurt as basic foods.
6. To become knowledgeable citizens who can distinguish between healthy food and non-healthy food products.

Competences: Investigative skills, manipulative skills, collaborative experiences, communication skills.

Task description

Phase 1

The instructor should give instructions and advice to students to go a supermarket or a local grocery shop and observe and take notes of various kinds of commercially available milk. He/she must warn the students that they must have their notes taken to school for the initial in-class discussion during the next class in school. Students must also purchase from the shop one small carton of fresh full-fat milk OR one carton of long-life sterilised milk. The instructor will arrange which students will buy one and which the other kind.

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Phase 2

In this phase, students will examine at home the effect of temperature on the acidification of milk. They will use two kinds of milk for this activity: fresh pasteurised milk, and long-life sterilised milk. They will get from a shop a carton of each of this kinds of milk.

ATTENTION. *Special instructions should be given for the heating of milk in the microwave oven at home. They should use only glass containers for the milk, and should not have any metal objects (e.g. spoon) put in the oven. The boiling of milk can be carried out alternatively by heating it in a small pan (especially if a microwave is not available at home). This boiling however should be done under the supervision of the student's mother.*

Phase 3

In this phase, students will prepare yogurt at home.

THEY MUST BE INSTRUCTED TO CARRY OUT THIS ACTIVITY AT HOME AFTER ONE WEEK AFTER STARTING phase 2.

Students should be told that they must ask their mother to help you with this preparation. The mother must do herself the boiling of the milk in the pan, and should collaborate with the student in the other stages.

The procedure for yogurt preparation is described in the student's part of this activity.

- Boiling of milk is necessary mainly to kill the unwanted microorganisms present in it. Also to remove air diluted in the milk, and to secure cohesion of yogurt with the thickening of the milk proteins. If milk precipitates during boiling, it is unsuitable for making yogurt. Milk that contains antibiotics (that came from animal treated with them) is also unsuitable and cannot settle.

(Instructions for the preparation of one portion of yoghurt)

- The temperature at which the boiled milk should be cooled down depends on the composition of the culture. Smaller temperatures (down to 38 °C) might be more appropriate. If the mixture fails to settle, it might be necessary that the students repeat the process using a smaller temperature.

- To check the temperature, students can use a clean kitchen thermometer if it is available. *THEY SHOULD BE WARNED TO NEVER use for this purpose medical thermometers, especially mercury glass thermometers.* If a kitchen thermometer is not available, they can check the temperature by first washing and drying their hands, and then dipping one of their fingers (the pointer) into the milk. To have the about right temperature, the finger must feel hot enough to maintain it for a short time into the hot milk. Students are asked to think the explanation for this feeling.

Like milk, acidity of yogurt increases with time and with temperature. Therefore, the yogurt must be kept in the fridge, where it can be maintained for a relatively long time (about one week). Even in the fridge, its acidity increases, so it becomes more sour with time. Formation of mould on its surface is a sign that the yogurt is unsuitable for eating.

Commercially available yogurt is usually packed in air-tight plastic cups, where it can be preserved (refrigerated) for longer time (about one month). The packing shows the expiration date. After opening, the product must be consumed within few days, and certainly not later than the expiration date.

Apart from natural yogurt, other types are also manufactured, such as strained yogurt, semi-skimmed or skimmed yogurt, and yogurt with fruits. There are also yogurts with additives that have health-related functions, such as yogurt with vitamins added, enriched in calcium (for prevention of osteoporosis) with omega-3 fats (for better blood circulation), or with natural phyto-sterols (for the reduction of cholesterol levels in blood).

Phase 4

In this phase, a general discussion will take place in class under the guidance of the instructor. Students should discuss their experiences from the activities with milk and yogurt. They should be instructed by the instructor to prepare in advance of this phase (at home) **statements** and/or to **formulate epistemic questions** about their observations and data. They will also discuss and compare natural milk and yogurt with other commercially available types of milk and yogurt that contain various additives.