

Quebec - Achievements and Competencies

Learning Outcomes

Cycle 1 (Gr. 1-2)	Cycle 2 (Gr. 3-4)	Cycle 3 (Gr. 5-6)
Food production techniques	Mixtures	Mixtures
Mixtures	Solids, liquids, gases	Solids, liquids, gases
Solids, liquids, gases	Changes in matter	Changes in matter

The Quebec Achievements and Competencies are based on the Progression of Learning Outcomes derived from the Quebec Education Plan set by the Ministère de l'Éducation, du Loisir et du Sport.

Specific Expectations

CYCLE 1 (Gr. 1-2)

LIVING THINGS

D. Systems and interactions

4. Food production techniques

- a. Describes the main steps in the production of various basic foods (e.g. making butter, bread, yogurt)

Students investigate how some foods, like cheese curds and butter, can be produced using cream, milk, and vinegar. The class can discuss the production of other dairy products, such as ice cream or yogurt, using the scientific knowledge and understanding they gained throughout this investigation.

MATERIAL WORLD

A. Matter

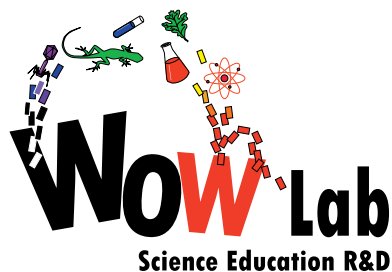
2. Mixtures

- a. Recognizes mixtures in his/her environment (e.g. air, juice, salad dressing, soup, raisin bread)

Students discover that cream is created by mixing butter and buttermilk together. In this investigation, the students will learn more about milk and cream, and how butter, cheese, and glue can be made from them.

3. Solid, liquid, gaseous state, phase changes

- a. Distinguishes among the three states of matter (solid, liquid, gas)



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Milk Medley - Quebec - Achievements and Competencies

Students will observe the characteristics and properties of milk and cream, before and after it is used to create butter, cheese, and glue. They will observe that milk is a liquid, but when mixed with vinegar, the change creates cheese curds, which are solid. The cream, when shaken, separates into butter and buttermilk, which are solid and liquid respectively. The glue starts off as a liquid but hardens into a solid. The students should be able to distinguish the properties that make solids, liquids, and gases.

F. Appropriate Language

1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. milk, curd, mixture, food production).

CYCLE 2 (Gr. 3-4)

MATERIAL WORLD

A. Matter

2. Mixtures

- a. Recognizes mixtures in his/her environment (e.g. air, juice, salad dressing, soup, raisin bread)

Students discover that cream is created by mixing butter and buttermilk together. In this investigation, the students will learn more about milk and cream, and how butter, cheese, and glue can be made from them.

3. Solid, liquid, gaseous state, phase changes

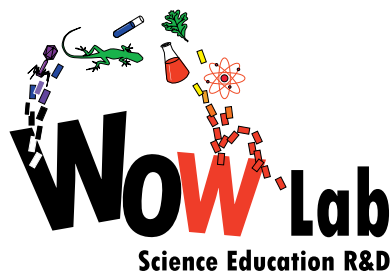
- a. Distinguishes among the three states of matter (solid, liquid, gas)

Students will observe the characteristics and properties of milk and cream, before and after they are used to create butter, cheese, and glue. They will observe that milk is a liquid, but when mixed with vinegar, the change creates cheese curds, which are solid. The cream, when shaken, separates into butter and buttermilk, which are solid and liquid respectively. The glue starts off as a liquid but hardens into a solid. The students should be able to distinguish the properties that make solids, liquids, and gases. They should recognize that in order to reverse the change from cream to butter and buttermilk, the butter and buttermilk need to be melted together to form the cream again (phase change).

5. Changes in matter

- a. Demonstrates that physical changes (e.g. deforming, breaking, grinding, phase changes) do not change the properties of matter

Students will learn that when cream is shaken long enough, it turns into butter and buttermilk. This is a physical change because no new substance was formed, but instead the substances that make the cream just separated. This is why when the butter and buttermilk are heated, they turn back into the cream. In the investigation with milk and vinegar, a new substance (cheese curds) was formed, therefore it is not a physical change but is instead a chemical change.



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F. Appropriate Language

1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. milk, curd, whey, mixture, physical change, reversible change, irreversible change).

CYCLE 3 (Gr. 5-6)

MATERIAL WORLD

A. Matter

2. Mixtures

- a. Recognizes mixtures in his/her environment (e.g. air, juice, salad dressing, soup, raisin bread)

Students discover that cream is created by mixing butter and buttermilk together. In this investigation, the students will learn more about milk and cream, and how butter, cheese, and glue can be made from them.

3. Solid, liquid, gaseous state, phase changes

- a. Distinguishes among the three states of matter (solid, liquid, gas)

Students will observe the characteristics and properties of milk and cream, before and after they are used to create butter, cheese, and glue. They will observe that milk is a liquid, but when mixed with vinegar, the change creates cheese curds, which are solid. The cream, when shaken, separates into butter and buttermilk, which are solid and liquid respectively. The glue starts off as a liquid but hardens into a solid. The students should be able to distinguish the properties that make solids, liquids, and gases. They should recognize that in order to reverse the change from cream to butter and buttermilk, the butter and buttermilk need to be melted together to form the cream again (phase change).

5. Changes in matter

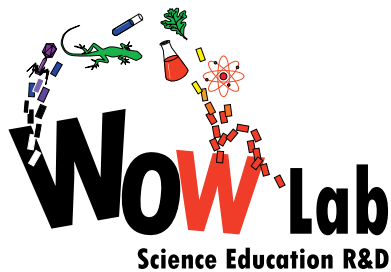
- a. Demonstrates that physical changes (e.g. deforming, breaking, grinding, phase changes) do not change the properties of matter
- b. Demonstrates that chemical changes (e.g. cooking, combustion, oxidation, acid-base reactions) change the properties of matter

Students should be able to identify the physical and chemical changes that occur throughout this investigation. When cream changes into butter and buttermilk, it is a physical change since no new substance are formed, and can therefore be reversed. When the milk curdles, due to the vinegar, cheese curds are made. Because the chemical composition has changed with the addition of vinegar to milk, this is a chemical change. The conversion of milk to glue is also a chemical change, and cannot be reversed.

F. Appropriate Language

1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. milk, curd, whey, mixture, physical change, chemical change, reversible change, irreversible change, homogenization).



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Strategies

EXPLORATION STRATEGIES

- Formulating questions
- Putting forward hypotheses (e.g. individually, as a team, as a class)
- Exploring various ways of solving the problem
- Imagining solutions to a problem in light of his or her explanations
- Using different types of reasoning (e.g. induction, deduction, inference, comparison, classification)
- Using empirical approaches (e.g. trial and error, analysis, exploration using one's senses)

STRATEGIES FOR RECORDING, USING AND INTERPRETING INFORMATION

- Using a variety of observational techniques and tools
- Using different tools for recording information (e.g. diagrams, graphs, procedures, notebooks, logbook)

COMMUNICATION STRATEGIES

- Exchanging information
- Comparing different possible explanations for or solutions to a problem in order to assess them (e.g. full-group discussion)