

Developing Competencies



PROJECT Agriculture
Project-Based Learning and
Teaching Series

Everyday Chemistry

Why is it important to know what we eat?



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Experiment with Milk Mixtures



Make It Personal

What milk mixtures do you eat or drink? What are your favourites?

Use the **Dairy Products Learning Source** to help you complete these learning tasks.



Investigate

Create your own bar graph that shows what milk is made of. Use the list of ingredients found in the **Dairy Products Learning Source**.

- Change each percentage to a fraction out of 100. For example, 88 percent would be 88 out of 100.
- Count each block in the grid as 10 out of 100. Colour the blocks in each column to show the fraction for each ingredient.

Water Lactose Fat Protein Minerals





Experiment

Milk is a liquid that is often mixed with other foods or beverages. Complete the following experiment to find out what happens when milk is mixed with other substances.

WHAT TO USE

- Milk
- Tea
- Water
- Sugar
- Vinegar
- Other substances to mix with milk
- Measuring cup or dropper
- Bowls or jars to mix the liquids

WHAT TO DO

Use a measure or dropper to mix milk with equal amounts of each of the four other substances in **What to Use**.

Mix milk with one other substance that you choose.

In the chart, record your observations and inferences.

Substances I Mixed with Milk	My Observations of the Results	My Inferences



Which of your mixtures were liquid? Which were solid? How do you know this?

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Were there different reactions when you added solid substances and acidic substances? Explain why.

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What effect do you think heat has on the mixture of milk and a substance like tea? Why do you think this?

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Which of your mixtures resulted in irreversible changes? Why were these changes irreversible?

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What effect do you think heat has on the mixture of milk and a substance like tea? Why do you think this?

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Target Learning

	<i>Yes</i>	<i>Sometimes</i>	<i>Not yet</i>
I look for patterns in multiple pieces of information to build my understandings.			
I use a chart to accurately record measurements and observations.			
I interpret observations and results to state an inference.			





Explore the Chemistry of Milk



Make It Personal

How many mixtures do you think you eat or drink on a daily basis? Describe two or three of your favourites.

Use the **What Happens to Milk at a Dairy Learning Source** to help you complete these learning tasks.



Investigate

Dairy processors use machines to put the cold milk into cartons, plastic jugs, glass bottles, or plastic bags. You will notice a “Best Before” date on containers of milk. The store cannot sell the milk after this date. If the milk has been kept refrigerated in your home, it should still be good for a few days after the best before date.

What does the “Best Before” date have to do with chemistry?



Pasteurization of milk is used to kill off bacteria. Is this a chemical reaction? If so, what makes this a chemical reaction?

By law, all milk in Canada must be pasteurized. It is illegal for anyone to sell or distribute raw milk and raw milk products. Why do you think the government passed this law?



Experiment

What are the properties of milk? How does milk mix with other substances? Try this experiment to find out.

WHAT TO USE

- Whole milk
- Skim milk
- Coffee cream or half-and-half (cereal cream)
- Three shallow bowls
- Red, green, yellow and blue food colouring
- Eye dropper
- Cotton swabs or toothpicks
- Liquid dish detergent

WHAT TO DO

1. Pour an equal amount of each type of milk (whole, skim, cream) into each bowl. Wait for the milk or cream to stop moving.
2. Add one drop of each of the four food colourings, one at a time, to each bowl. The different colours will help you see how the food colouring mixes with the milk and cream.
3. Observe what happens. Record your observations and respond to the questions.



Type of Milk	My Observations of the Results

How did each type of milk or cream react to the food colouring?
 Why do you think the milk and cream reacted this way?

WHAT TO DO NEXT

- Now dip a cotton swab or toothpick into the dish detergent.
 Touch the swab or toothpick into the middle of the bowl of milk.
 Keep adding more dish detergent with the swab.
- Observe what happens. Record your observations.

Type of Milk	My Observations of the Results



Describe what happened when the dish detergent was added to each type of milk or cream. Explain the reactions you observed.

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Why do you think there was a difference between the way milk and cream reacted with the food colouring and dish detergent?

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Experiment

Does milk change when it starts to go sour? Do this simple test to find out.

WHAT TO USE

- Milk
- Sour milk
- Litmus paper
- Two shallow bowls

WHAT TO DO

1. Pour an equal amount of the milk and sour milk into each bowl.
2. Test each with the litmus paper.
3. Observe what happens to the litmus paper. Record your observations and respond to the question.

Litmus paper is used to measure the acidity of a substance. Litmus paper will turn red if a substance has more acidity. If the substance is more neutral, the litmus paper will be a blue or light purple colour.



Type of Milk	My Observations of the Results

What difference did you notice between the regular milk and soured milk? Why do you think this difference exists?

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Investigate Food Changes



Make It Personal

What mixtures have you used in a food recipe?

Use the **Milk Mixtures Learning Source** to help you complete these learning tasks.



Investigate

Can you think about recipes that mix milk with other ingredients? What products do these mixtures create? Does the recipe use heating or cooling? Describe three of your favourites.

Recipe	What is Mixed with Milk	Heating or Cooling
Pancakes	Flour and eggs	Heating

What difference does the fat content make to different types of milk? Why?



Experiment

Make your own mixture with the experiment that follows.

Can you design your own food experiment that changes a liquid to a solid or a solid to a liquid?

WHAT TO USE

- Salt
- 125 ml of whipping cream
- Colander
- Glass or plastic jar with a lid

WHAT TO DO

1. Place 125 ml of whipping cream into a glass or plastic jar with a lid. Take turns with a partner shaking the jar. Shake it for at least ten minutes.
2. At first, the cream will start to look like whipped cream. Keep shaking!
3. When a lump forms, pour the contents of the jar into a colander to separate the solid. Here's a hint! You can add a little salt to it, mix it well, and spread it on a cracker!

What product do you think you are making? Why do you think this?

Is the mixture you made reversible or irreversible? How do you know this?

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Target Learning

	Yes	Sometimes	Not yet
I explain how the a chemical reaction causes a change in a food product.			
I identify real life examples of liquids, solids and mixtures.			
I explain the difference between reversible and irreversible changes that occur in food mixtures.			



Analyze Numbers and Patterns



Make It Personal

Have your dairy consumption patterns changed at all over time? In what ways? Why do you think your patterns have or have not changed? Do you think they will change in the future?

Use the **Dairy Patterns Learning Source** to help you complete these learning tasks.

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Investigate

What do the numbers below tell you about Canada's dairy production? Create a bar graph to find out.

- 0.35 of Canada's total milk supply is made into milk and cream
- 0.30 of Canada's total milk supply is made into butter
- 0.28 of Canada's total milk supply is made into cheese
- 0.07 of Canada's total milk supply is made into ice cream and concentrated milks

Use the **Grid Graph** to fill in the proportion of each type of dairy product. You can also create a graph on chart paper.

Make a legend that includes the names of the products and the colour you will use for each. Add it to the graph. You can also add illustrations of each product to your legend. Make a title for your graph.

Use these steps:

1. Choose a colour to represent each product.
2. Make a legend. List the dairy products. Choose a colour for each product and show it in a box or line beside each product name.
3. Express each decimal as a fraction out of 100. Then, colour in the correct number of blocks in the graph to represent the fraction for each product until all the squares in the graph are coloured in. For example, 7 blocks should be coloured with the colour you choose for ice cream and concentrated milks.

Interview an adult in your life, such as your parents or grandparents, to find out whether their milk consumption patterns have changed over time. What did you find out? Share your findings with your classmates.

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Target Learning

	Yes	Sometimes	Not yet
I share the conclusions I make with others.			
I look for patterns in multiple pieces of information to build my understandings.			
I ask questions and make predictions to identify answers to questions.			
I reflect on what I have learned.			