# EXPLORE THE **chemistry** OF **milk**

## Think About

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

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## Investigate

Dairy processors use machines to put the cold milk into cartons, plastic jugs, glass bottles, or plastic bags (in eastern Canada). 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?

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**What is the chemistry of milk?** Go to **www.projectagriculture.ca/elementary** to find the carousel slide with this guiding question in the **everyday** CHEMISTRY topic. Use the information in the carousel slide and the **What Happens to Milk at a Dairy Learning Source** to help you complete these learning tasks.

**Best Before** dates tell you until when the quality of the product will be best. They do not mean a product has to be immediately discarded as soon as the Best Before date has been reached.

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. 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 (3.25%)
- Skim milk
- Coffee cream (18%) or half-and-half cream (10%)
- 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 |
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How did each type of milk or cream react to the food colouring?
Why do you think the milk and cream reacted this way?

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**WHAT TO DO NEXT**

4.  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.

5.  Observe what happens. Record your observations.

| Type of Milk | My Observations of the Results |
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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.

**TIP!** To make sour milk, add vinegar or lemon juice to the milk. Or you can leave it out overnight with the lid off or the carton open.

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