

# Milk Matters



**LEVEL:** Grades PreK – 6  
**SUBJECTS:** Science  
**SKILLS:** Observing, comparing  
**MATERIALS:** cups, mason jar with lid, heavy whipping cream, napkins, knife/spatula, spoons, milk, sugar, egg substitute, rock salt, ice, vanilla, whipping cream

**PRE-TEACH:** Substances can be changed from a solid to a liquid or from a liquid to a gas if they are provided with the necessary energy. If we want to melt a block of ice or make water into steam, we need to provide heat energy. The energy is absorbed as the change occurs.

When the process goes in the other direction, from gas to liquid to solid, the opposite process takes place and energy is released. To freeze water, we place it in a freezer compartment where energy will be extracted, allowing the water to freeze.

When students are making ice cream, they can observe changes of matter in both directions. As the ice and salt melt to a liquid, they absorb energy; they absorb this energy from the liquid milk mixture since it is warmer. This, in turn, causes the milk mixture to cool because energy is being removed. When the milk mixture has enough energy removed the liquid will freeze or turn into ice cream. The addition of salt to the ice lowers the freezing temperature. This will help the milk mixture to freeze sooner, because the mixture will reach the freezing temperature sooner.

## Ingredients for 2 Students

(Two 1-cup servings)

- 1 cup whole milk
- 1/2 cup sugar
- 1 teaspoon vanilla
- 1 cup whipping cream
- 3/4 cup rock salt
- Plenty of Ice
- Zip lock freezer bags

## PROCEDURE:

### **Ice Cream in a Bag**

1. Review the definitions of liquid and solid and give oral examples of each.
2. Put the milk, whipping cream, sugar and vanilla in the 1 quart freezer bag and seal. Use zip-lock or fold a piece of duct tape over seal.
3. Place the qt. bag with the ingredients inside a gallon freezer bag.
4. Pack the larger bag with ice and pour salt evenly over the ice.
5. Seal the outer bag. Wrap in a cloth or paper towel and shake for 10 minutes. Pairs of students can take turns.
6. Depending on the outside temperature, you may need to replace the ice/salt when cubes are melted.
7. Open the outer bag and remove the inner bag with the ice cream. Wipe off the ice cream bag to be sure salt water doesn't get inside.
8. Cut the corner off and squeeze into cups. Serve plain or top with nuts, coconut or fruit. ENJOY!

## Conclusion:

- The milk was in the liquid phase of matter when we started.
- The milk was in the solid state of matter when we finished.
- In order to change the phase of the milk we had to remove heat.
- The heat energy that left the milk melted the ice.
- Salt was needed in order to lower the melting point of the ice because the freezing point of water is slightly higher than the freezing point of milk.

- Heavy whipping cream
- Small jar with lid (baby food) or 2oz. plastic cups with lids

### **Butter in a Jar**

Pour heavy whipping cream into a jar (plastic or glass; small plastic oz. cups with lids available from restaurant supply stores or your cafeteria, work great and then everyone can make their own butter). Fill the container 1/2 full—you'll need some air space. Make sure the lid is secure. Wrap in a paper towel. Shake briskly; the more cream in a container, the longer it will take. Cream in 2 oz. containers should take 3-5 minutes. First it will become whip cream (unsweetened) and then the solids separate from the liquid and you have butter and buttermilk. Serve butter on a saltine cracker since no salt has been added.

## **BRIEF DESCRIPTION**

Students will make ice cream or butter so they can observe the process of the liquid changing to a solid.

## **OBJECTIVES**

The students will:  
-- Students describe properties of objects and materials before and after they undergo a change or interaction.

--Explain that matter has different states and that each state has distinct physical properties.

## **ESTIMATED TEACHING TIME**

45-60 minutes

## **MAINE LEARNING RESULTS**

Grades 3-4  
Math: B4  
Science: D3

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