

WHAT'S SHAKIN'?

Making Butter to Demonstrate Changes in Matter

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Tennessee 4-H Youth Development

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Making Butter to Demonstrate Changes in Matter

Skill Level

Beginner

Learner Outcomes

The learner will be able to:

- Determine the difference between a change of state and a chemical change.
- Define the states of matter.
- Draw connections to other physical changes.

Educational Standard(s) Supported

- 5.PS1.1: Analyze and interpret data from observations and measurements of the physical properties of

Success Indicator

Learners will be successful if they:

- Explain changes to states of matter that occurred in the process of making butter.

Time Needed

45 minutes

Materials List

Heavy Whipping Cream, Jars, Crackers
Optional: Colored Pencils/Markers

Introduction to Content

This lesson helps to reinforce the scientific concepts related to changes of states in matter. In this lesson, students see firsthand the change of state of heavy whipping cream into butter. Students will form a hypothesis predicting what they think will happen and then record their observations in a science journal.

Introduction to Methodology

The lesson begins with a pre-assessment of students' knowledge of the states of matter. Information will be presented on different physical and chemical changes. After this, students make butter and connect what they have learned to previous experiences.

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Terms and Concepts Introduction

States of Matter — The three states in which all matter exists.

Solid — A state of matter in which the material has a definite shape and volume.

Liquid — A state of matter in which the material has a set volume but no set shape.

Gas — The third state of matter in which a material has no set shape or volume.

Setting the Stage

Begin by saying, *“Today, we’re going to do a fun science experiment, but before we do that, we’re going to do a short activity. I need everyone to take out a piece of paper and get out three different colored pencils or markers. Everyone needs to find a buddy in the next one minute and 37 seconds. Please have your paper and pencils out, your partner selected, and be ready to go.”*

Opening Questions

Ask students to respond to the following prompt on their piece of paper: *“What do you know about the states of matter?”* (Students will then write information on their paper. Give them about two minutes to complete this portion.)

Then say to students, *“Ok, everyone, now pick a different color to write in, and work with your partner to share what you wrote down. If your partner has something you forgot about, write that down on your paper.”* (Students will then share with partner and continue writing.) Then say to students, *“Now we are going to share as a class, everyone pick a different color and as we share, write down anything you or your partner may have missed.”* (Have the class share what they have written down and capture their responses on the board.)

Experience

After completing the think-pair-share activity, you will be able to assess how much knowledge your students have about changes of state. Briefly share with the students that all matter exists in one of three states: solid, liquid or gas. These states depend on the material, the temperature and other things going on in the environment. Additional information to share with the students can be found in the supplemental information of this lesson plan.

After sharing the information with the students, say to them that they are now going to see changes of state in action by making butter. Pass out the butter-making materials to students and give them the instruction to just start shaking! The faster the students shake, the faster their butter will be made.

During this process, explain that as the cream in the jar is shaken, the heat produced helps to change the state of the butter. Reinforce to the students that just because the cream is changing from cream to butter, no chemical changes are taking place. This is an example of a physical change, which is in the form of a change of state.

Every 60 seconds during the process, ask the students to pause and observe their jar. Students should then record their observations and note any changes that have occurred since their last observation.

What’s Shakin’?

Tips for Engagement

Some students will make butter faster than others. It’s important to keep all students engaged throughout the entire process. Having them make observations after they have finished is critical to maintain student engagement.

Share

Ask students, “*Who can tell me what we just did to the cream in our jars?*” Students should share that the cream underwent a physical change and was made into butter.

Select other students and ask them, “*Do you think that the chemical properties of the cream have changed or are they still the same after being made into butter?*” Some students may respond with *yes*, but the correct answer is *no*, and you should reinforce that chemical changes result in the creation of new materials. This was just a physical change of state.

Process

Ask students, “*Why is it important that we understand how chemical, physical and changes of state matter?*” (Answers will vary.)

Generalize

Have students share other changes of state that they have seen frequently.

Apply

If time allows, have students break into small groups and ask them to identify other activities that could also demonstrate a change of state. After each group has come up with an experiment, ask them to share their idea with the class.

Reference:

http://www.windows2universe.org/earth/geology/change_state.html

Life Skill(s) from TIPPs for 4-H

5th Grade

Participate in 4-H Club meetings by saying pledges, completing activities and being engaged

Supplemental Information

A snowman, glass of water and steam might look very different but they are made of the same stuff! Just like any substance, water can exist in three different forms, called states: solid, liquid and gas. The state will change when the substance is heated.

As a solid, a substance has a fixed volume and shape and is usually unable to flow, except in the case of glaciers. For instance, an ice cube or snowflake is the solid state of water.

When a solid is heated, it turns into a liquid. As a liquid, a substance has a fixed volume, but its shape changes to fill the shape of its container. For instance, a glass of water is the liquid state of ice.

When a liquid is heated, it turns into a gas. As a gas, a substance does not have a fixed volume or shape. Gas expands to fill the shape and volume of its container. For instance, the steam that comes out of a hot teakettle, making the whistle sing, is water in the form of a gas.

Heat causes substances to change their state because, when heated, the molecules within the substance move around faster. The faster the molecules bounce about, the weaker they are held together.