



## Overview:

Students explore how a liquid changes to a solid by making soap.

## Objectives:

The student will:

- observe how a change in temperature causes a phase change in a substance; and
- explain how a change in temperature causes a phase change in a substance.

## Materials:

- Commercial glycerin bar soap making kit, or glycerin soap base and mix-ins such as colors and scents
- Soap molds, if not included with kit
- Hot plate, or access to a microwave
- Double-boiler if using hot plate, microwave safe glass container if using microwave
- Hot pads or tongs
- STUDENT WORKSHEET: “Soapy Solids” (Level I)
- STUDENT WORKSHEET: “Soapy Solids” (Level II)

## GLEs Addressed:

- [3-4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [3] SD3.1 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by recognizing that temperature changes cause changes in phases of substances (e.g., ice changing to liquid, water changing to water vapor, and vice versa).
- [4] SD3.1 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by explaining that temperature changes cause changes in phases of substances (e.g., ice changing to liquid water and liquid water to water vapor).

## Activity Preparation:

1. Make sure that all parts of the soap making kit are ready to be used. Divide the glycerin or soap making material into small blocks.
2. Arrange for older students or parent volunteers to assist with the activity.

## Activity Procedure:

1. Hold up several bars of soap and ask students what they are and how they are used. Write student responses on the board or chart paper.
2. Inform students that they will be making soap and show them the soap making kit. Go over the directions with the whole class, remembering to use the terms “solid” and “liquid” as the ingredients are explained.
3. Divide students into small groups with a parent volunteer or older student assistant in each group. Instruct groups to make the soap according to manufacturers instructions.

4. Make sure students heat enough solid blocks for each person in their group to make one bar of soap. The older student or parent volunteer should melt the block in the microwave or in a double boiler pan on the hot plate.
5. Once the solid is melted into a liquid, add the color and/or scent as decided by the group. Direct the helper to pour the liquid into the mold.
6. It will take 20-40 minutes for the soap to become a solid.
7. After the soap is made, bring the class together and discuss what happened to the materials as they made the soap. Students should come up with three steps: solid, liquid, solid. If students do not mention that the soap was made because of temperature change, review that part of the process.

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**Teacher's Note:** Most objects on Earth will change state at a specific critical temperature. That critical temperature is different for each object. For example, the melting point of water is 0°C (32°F). Glycerin has a melting point of 20°C (68°F).

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8. After the discussion, instruct the small groups to get back together and pop the soaps out of the molds.
9. Distribute the STUDENT WORKSHEET: "Soapy Solids" and ask students to complete the worksheet with a partner. (*NOTE: Level I and Level II have different worksheets.*)

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**Critical Thinking Activity: Activity Response Method.** Ask students to write about or verbally share with a partner something new that they learned about soap and how it is made. They can begin their response with a sentence such as "I was surprised to learn" or "I understand this about soap."

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**Extension Idea:** Discuss why soap is important to use in our daily lives and how it keeps us free from germs. It is interesting to note that soap does not kill germs; it just makes them easier to wash off. Ask students to keep track of how many times a day they wash their hands with soap for 3 days. Use a tally sheet. Bring the data back and make a classroom graph with the information. ([3-4] N-1, [3-4] S&P-1, Skills for a Healthy Life A3)

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## Answers:

### **STUDENT WORKSHEET: "Soapy Solids" (Level I)**

1. Each illustration should depict the following:
  - A) solid cube
  - B) melted into a liquid in a container
  - C) solid soap in a mold
2. Decrease in temperature

### **STUDENT WORKSHEET: "Soapy Solids" (Level II)**

1. The following should be written, with an illustration of each:
  - A) solid cube
  - B) melted into a liquid in a container
  - C) solid soap in a mold.
2. Decrease in temperature

Name: \_\_\_\_\_

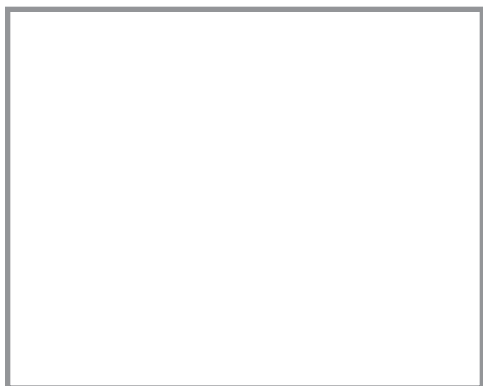
# Soapy Solids

## Student Worksheet



1. With a partner, draw what happened when you made soap.

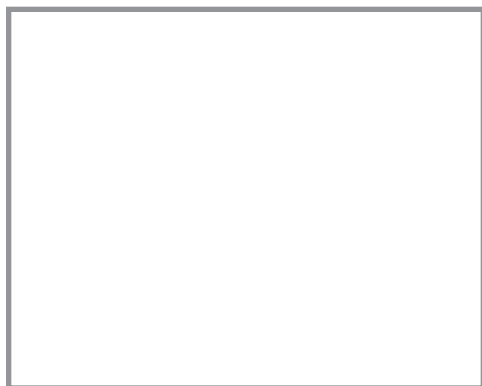
A. solid cube of soap



B. melted soap



C. solid soap in mold



2. Why did the soap change from a liquid to a solid?

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Name: \_\_\_\_\_

Level

# Soapy Solids

## Student Worksheet

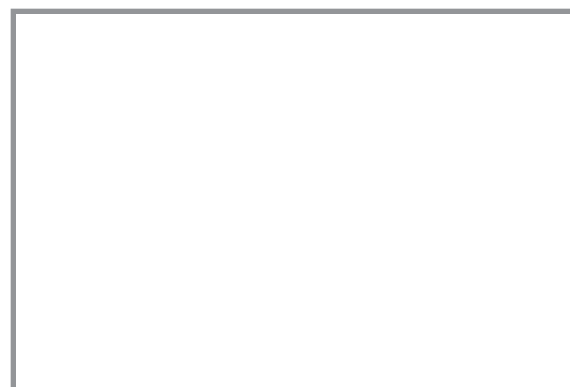
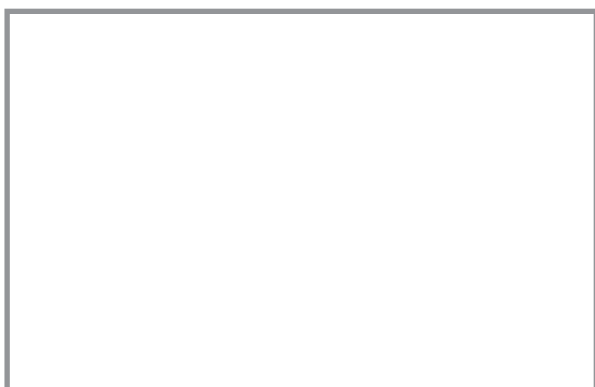


1. With a partner, draw what happened when you made soap. Write what is happening in each of the pictures.

A. \_\_\_\_\_ B. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



C. \_\_\_\_\_



2. Why did the soap change from a liquid to a solid?

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\_\_\_\_\_  
\_\_\_\_\_