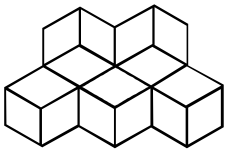
COOL IT!



BENCHMARKS and TASKS

SC.A.1.1.2 The student recognizes that the same material can exist in different states.

SC.A.1.1.3 The student verifies that things can be done to materials to change some of their physical properties (e.g., cutting, heating, and freezing), but not all materials respond the same way (e.g., heating causes water to boil and sugar to melt).

- The student classifies matter as a solid, liquid, or gas, based on its properties and/or behaviors.
- The student demonstrates that some common materials, such as water and sugar, can be changed from one state to another by heating or cooling.
- The student recognizes that matter is made of the same original material even after a physical change such as cutting, melting, freezing, dissolving, or evaporating.

KEY QUESTION

How does the removal of heat cause a change in matter?

BACKGROUND INFORMATION

Butyl stearate is a colorless, odorless ingredient used in lip ointments. It is normally bottled in its liquid state, but when cooled, will change to a solid state. When re-warmed, such as by holding it in the palm of your hand, it will change back to a liquid. Water and other water-based ingredients will not mix with butyl stearate.

MATERIALS

Teacher

1 cup with 2 Tbsp. water
1 cup with 2 Tbsp. butyl stearate
timer
Matter Really Matters (Let's Wonder About Science Series)
What Is Matter? (Benchmark Education Co.)
What Is Matter? (Newbridge)

Per group

small, clear cup containing 2 Tbsp. water (room temperature) – labeled #1
small, clear cup containing 2 Tbsp. butyl stearate – labeled #2
ice cubes
magnifiers paper towels 2 stirrers
Liquid Comparison worksheet

TEACHING TIPS

1. Butyl stearate may be ordered from Delta Education, Inc.
   P.O. Box M
   Nashua, NH 03061 (Phone 800-442-5444)
   ***Order early in the year. May take several weeks to receive. Inexpensive.*
2. Caution students never to put substances in their mouth unless instructed to do so by the teacher.
3. Butyl stearate can be poured back into the bottle and reused.

ENGAGE

1. Give students the two labeled cups of liquids: one cup contains pure water and one cup contains butyl stearate. (Do not reveal the names of the liquids at this time.)
2. Have students use magnifiers to observe and discuss the properties of cup #1 (clear, wet, cool, odorless, etc.).
3. Have students use magnifiers to observe and describe the properties of cup #2 (clear, oily, has an odor, etc.).
4. Record student responses on a Venn diagram or Double Bubble Map.
5. Discuss how the two liquids are alike and how they are different.
6. Have students guess what is in each cup. Explain that one cup contains water and the other contains a substance called butyl stearate, which students will continue to explore.

EXPLORE

1. Give each group the *Liquid Comparison* worksheet, ice cube, and stirrer.
2. Tell students to combine the container of water with the cup of butyl stearate and then record their observations.
3. Ask students to add one ice cube to the butyl stearate and water mixture. Have them record their observations of how ice cubes react with the butyl stearate/water mixture.

EXPLAIN

Ask:
What are the properties of liquids? (Liquids take the shape of the container; solids can easily pass through liquids.)
What are the properties of solids? (Solids have a definite shape.)
What state of matter is water?
What state of matter is butyl stearate?
How did butyl stearate react when water was added to the cup?
What state of matter is the combination of water and butyl stearate?
After adding the ice cube, how did this change the butyl stearate? (The liquid changed into a solid.)
How could you change the butyl stearate back into a liquid state?
(It can be changed back by heating it. Students can try this by holding pieces of butyl stearate cupped in their hands. The warmth from their hands will be sufficient to change the solid back into a liquid.
This activity verifies that things can be done to materials to change some of their physical properties (e.g., cutting, heating, freezing), but not all materials respond the same way.

EXTEND/APPLY

1. Explain that butyl stearate is an ingredient in lip ointments.
   Ask:
   Why is it important that this ingredient respond to warmth by changing into a liquid? Most lip ointments are a solid when applied to the lips. However as they adjust to the body's warmth, they liquefy, which makes it easier for them to be absorbed into the skin.
2. Read and discuss any of the recommended books.

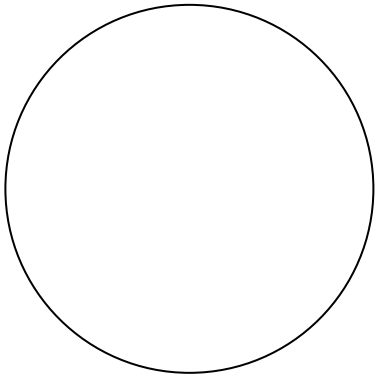
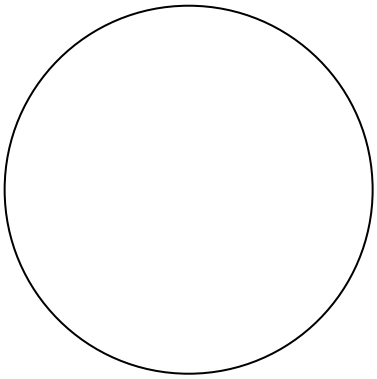
ASSESSMENT

Completion of *Liquid Comparison* worksheet.
Teacher observation through class discussion.
Can identify matter as solid, liquid, or gas.

Student Scientists:_____

LIQUID COMPARISONS

Draw and describe what happens when certain substances are added to butyl stearate.

Draw in the circle what you observed when each substance was added to the cup of butyl stearate.	**Water** 	**Ice Cubes** 
Describe what you observed.		