A State Debate!

Although the three states of matter are solid, liquid, and gas, not all substances seem to fit perfectly into one of these groups. Take a look at the substance below and see if you can decide whether it should be called a solid, liquid, gas, or something in between.

Materials:

- Shaving cream
- Paper towel
- Penny
- Magnifying glass (optional)
- Activity

Procedures:

1. Place a small mound of shaving cream on a paper towel. Look at the shaving cream. Would you call it a solid, liquid, or a gas? Why? One characteristic of a solid is that it keeps its shape without being in a container. Does this make the shaving cream a solid? Why or why not?
2. Very gently place a penny on top of the shaving cream. What do you observe? Does the shaving cream act most like a solid, liquid, or gas?

3. Shaving cream is very light. Look at it very closely or use a magnifying glass if you have one. What do you think makes it so light? Does this make you change your opinion of whether it is a solid, a liquid, or a gas?
4. Rub a little shaving cream between your thumb and index finger. Does it feel like a solid, liquid, or gas?
5. Leave the shaving cream blob out over night. Look at it very closely the next day. How has it changed? Has its state changed? Leave it for a few more days and see if you think it has changed state.

Think about this ...

Another example of a substance with a weird state is a mixture of corn starch and water. In a cup, place 2 tablespoons of corn starch and 1 tablespoon of water. Mix with a popsicle stick. If you mix quickly the material will act more like a solid. If you mix slowly, it will act more like a liquid. Poke it with the Popsicle stick and then press it gently. What do you notice?

Where's the Chemistry?

It's not always so easy to say definitely that a substance is a solid, liquid, or gas. Some materials, like cornstarch mixed with water, can act more like a solid when treated a certain way and more like a liquid when treated a different way. Shaving cream seems to have an unusual state because it is a liquid soap with a lot of gas bubbles mixed in it. The gas makes it so thick and frothy that it keeps its shape and supports light objects like a solid. When you let the liquid from shaving cream evaporate, all that's left is the very light and thin solid soap and the spaces where the gas bubbles were.

The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".