Cotton Candy

COLLEGE OF NATURAL SCIENCES
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Overview

There are a lot of engaging activities and experiments one can use to teach phase changes: water with and without various solutes, isopropyl alcohol, the coconut oil from this kit… and then there's cotton candy.

Theory

To make cotton candy, floss sugar must undergo two phase changes. A cotton candy machine melts the floss sugar (solid → liquid), then extrudes the liquid sugar through small holes, causing it to freeze (liquid → solid) in the long, thin strands we know as cotton candy. The macroscopic structure of the sugar has changed from the first stage to the last, but it is a solid in both cases. The chocolate-melting activity in the Solids & Liquids kit is a good complement to this activity; when the chocolate freezes in the candy molds, it has clearly returned to its solid state, just in a new shape.

Doing the activity

Necessary materials:

- cotton candy machine
- floss sugar
- paper cones or sticks (for serving)

1. Plug in the cotton candy machine and let it come to temperature.
2. If you have a doc cam, set it up over the machine so that students can easily view the process of cotton candy formation.
3. Show students the floss sugar, and discuss its state of matter. Students will likely readily identify the sugar as a solid; ask them to support their thinking with specific observations of the sugar.
4. When the cotton candy machine is at temperature, add floss sugar as directed by the machine manual. Encourage students to consider the phase changes that occur. What observations are your students making that support the phase changes they identify?
5. When a sufficient quantity of cotton candy has built up, catch it around a paper cone or stick. Before serving, ask your students: What state of matter is the sugar now? How do they know? (The sugar looks pretty different now, but it's still a solid — it doesn't flow like a liquid, or expand to fill a container like a gas. If you could see the structure of the cotton candy at a molecular level, it would still look fundamentally like the floss sugar would at that same level.)

Summing up

Cotton candy is a highly engaging, relatable, and valuable way to teach key aspects of phase changes and states of matter..

For more information

Little Shop of Physics: https://www.lsop.colostate.edu

Colorado State University College of Natural Sciences: https://www.natsci.colostate.edu