Curiosity Guide #308
Candy Science

Accompanies Curious Crew, Season 3, Episode 8 (#308)

Marshmallow Melee

Investigation #4

Description

What does air pressure do to marshmallows? Find out!

Materials

- Package of mini marshmallows
- Empty 20-ounce plastic bottle
- Safety goggles
- Fizz-Keeper Pump
- Water-based marker
- Large syringe

Procedure 1

1) Fill the plastic bottle three-fourths full of mini marshmallows.
2) Screw on the Fizz-Keeper Pump.
3) Draw a mark on the side of the bottle to show the top of the marshmallow pile.
4) Put on your safety goggles.
5) Begin to pump. Be sure to count the number of pumps. Do not do more than 30 pumps.
6) What happens to the marshmallows?
7) Slowly unscrew the pump and watch what happens to the marshmallows.

Procedure 2

1) Place a couple of the small marshmallows in a sealed syringe.
2) Slowly draw the handle back.
3) What happens to the marshmallows now?

My Results

Explanation

The Fizz-Keeper pump is designed to pump air into the bottle and add air pressure. The additional air molecules begin to squish the marshmallows. Marshmallows are made of whipped sugar, so half of their mass is air. Increasing the air pressure in the bottle collapses the air pockets in the marshmallows. The size of each marshmallow gets much smaller.

When the pump is unscrewed, the air pockets in the marshmallows begin to expand again, making it look like the marshmallows are growing.

The marshmallows in the syringe grow when the handle is pulled back. This is because there is more space for the air molecules to move, and the air pressure is lower than the air outside the syringe. The air pockets in the marshmallow spread out when the inner air molecules collide with the marshmallow itself, and the marshmallow gets bigger.

Do you know your marshmallow history? Ancient Egyptians were the first candy chemists to make marshmallows over 4,000 years ago. The original marshmallow was made from the Mallow plant that grew in marshy areas in Asia and Europe. Egyptians squeezed the sap from the plant and mixed the sap with honey and nuts. By the mid 1800's, French candy chemists discovered that they could whip the sap by hand.

Eventually, the mallow plant was replaced with gelatin in marshmallow chemistry, although the name of this candy didn't change. Today's marshmallows still get whipped up with a lot of sugar and air. When combined with chocolate and graham crackers, marshmallows make the perfect chemistry treat!

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