



Curiosity Guide #408

Chocolate Chemistry

Accompanies Curious Crew, Season 4, Episode 8 (#408)

Melts in Your Mouth, Not in Your Hand

Investigation #3

Description

To melt or not to melt...that is the question.

Materials

Milk chocolate

Dark chocolate

Food serving gloves

Plastic knife

Friends

Flexible straws to model saturated and unsaturated fats

Procedure

1. Break or cut off small pieces of both the milk chocolate and dark chocolate.
2. Have your friends place a small piece of milk chocolate on the left side of their tongues and a piece of dark chocolate on the right.
3. Meanwhile, hold two samples of the same types of chocolate in your hand.
4. Ask your friends which type of chocolate melts faster in their mouths. Why?
5. What about the chocolate held in your hand? Does one type melt faster than another?
6. Divide the straws in half. Keep half of the straws straight, and bend the other half at the flexible joints.

7. Which model do you think represents saturated fats? Which one represents unsaturated fats? Why do you think so?

My Results

Explanation

Matter comes in different forms, one of which is a solid. Solids are made of molecules that have limited movement. When heat energy is added, the particles move more quickly and can move past one another. This is what happens when solids melt and change from a solid to a liquid state. Different solids have different melting points. In this case, milk chocolate melts at 97 degrees Fahrenheit, sooner than the dark chocolate. The inside of our mouths is warm enough to melt the milk chocolate, while our hands are closer to between 80 and 90 degrees, which won't melt the milk chocolate.

One of the ingredients in chocolate is cocoa butter, a solid fat at room temperature. These fat molecules are saturated fat acids packed more closely than fatty oils or unsaturated fats, that are liquid at room temperature. The molecular structure of the saturated fats, which you showed with straight straws, is straight. This straight configuration allows molecules to line up closely, while the unsaturated fatty acids are bent in structure and maintain liquid forms at room temperature.

Think about this: Matter comes in different forms, but those forms can change. Have you ever watched an ice cube melt? The ice cube starts as a solid, but when the ice warms up, it turns into a liquid. At first, the molecules are close together in an ordered pattern, with each one vibrating. As the temperature increases, the molecules move more quickly and begin to move past one another. Now the ice cube is in a liquid form. Increasing the temperature even more will get those molecules moving even faster. Faster molecules at a higher temperature will make the liquid vaporize. Different substances will change phases at different temperatures, including chocolate!

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