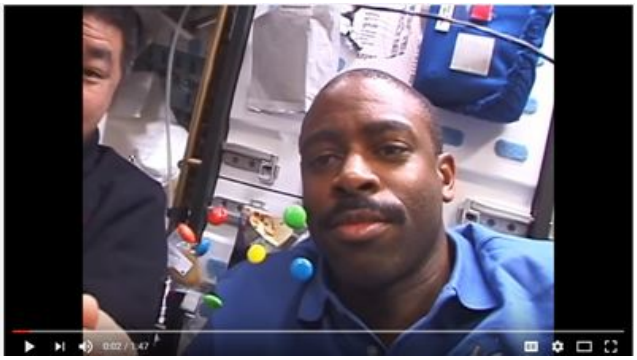
Dissolve the Candy Coating



Who says you can't play with your food? In space, Leland used water bubbles to drink his snacks! Follow the experiment to see what happens to candy coating when it's mixed with water here on earth.

The image of Leland eating candies floating inside a water bubble was taken onboard the International Space Station during STS122. (You can check out the video at https://www.youtube.com/watch?v=edPZYCRPgu0.)

Astronauts use water to capture floating food particles and "drink" them down while living in zero gravity environments.

Astronauts conduct experiments in space to determine how certain elements and chemical components will respond to a new environment. While you won't conduct your experiment in space (just yet!) you can learn a lot right here on earth, in your own kitchen.

Check out the video from the Space Station. Leland ate his M&M's before we were able to observe if the water had any affect on the candy coating. In this activity you will answer the basic question – *What happens to candy coating in water?* As you follow the procedure and conduct the experiment, be sure to record your observations. After you gather the results, you can alter the design and create your own experiment!

Materials you will need:

- Sweets/Chocolates with a colored candy coating (like M&M's, Reese's Pieces or Skittles)
- White plastic or foam plates

- Room-temperature water
- Measuring Cup
- Crayons or colored pencils
- Container for discarded water
- Paper towels
- Timer or Watch
- Paper

Notes as you begin:

- Safety first! Always wear proper fitting goggles for experiments.
- Be sure to conduct your experiment on a stable surface in a room where spills can be easily cleaned up.
- For best results, use plates with the flattest bottoms possible. Any size plate will work, but smaller plates require less water.
- A drawing can be an effective record of observation. Use the crayons and colored pencils to "draw" and record your results.
- Use the container to discard liquid from the plates after each experiment is complete. Dispose of the discarded water appropriately.
- You can dry the plates with paper towels so that the plates can be used more than once.

Observe:

For this experiment the first step is observation. Observe your candy and note any basic characteristics such as:

- Size
- Shape
- Color
- Texture

Ask questions and note any special characteristic such as:

- Does it have different colored layers on the inside?
- Does it have additional ingredients (nuts, etc.)?

You may need to cut or break open a few pieces of candy to find out all of the characteristics, but be careful! You may be tempted to bite them in two – but resist the urge! It is never recommended to eat or drink items from

your experiment!

Procedure:

1. Use one plate for one candy. Measure and pour enough room temperature water into the plate so that the water is deep enough to completely cover the candy.
2. Once the water has settled, place one candy in the center of the plate. Be careful to keep the water and candy as still as possible so you can observe what happens without agitating the water.
3. Observe for about 1 minute without disturbing the plate.
4. Record your results in writing or with a visual drawing.
5. To repeat with a different colored candy, discard your water in the container, dry the plate and begin again. For comparable results with different colored candies, use the same amount of water each time.

Questions to Investigate:

In this experiment you saw what happened to candy coating when it was exposed to water. The coating dissolved. That's because candy coating is made up mostly of sugar and sugar dissolves in water. But why does sugar dissolve in water when other substances do not?

Some of the basic chemistry concepts you can investigate to answer that question include:

- Molecules and charge. A water molecule has an area of positive charge and an area of negative charge.
- How molecules attract and interact based on their charge.
- Dissolving a substance depends on the interaction between molecules. In our case, how the water molecules interact with the molecules of sugar in the candy coating.

What other questions would you ask based on your observations?

- Did the dissolving sugar create a pattern in the water?
- Did the color float or sink?
- Did the inside filling also dissolve? Why not?

These are all good questions to investigate - and that is what chemistry is all about! Leland's love for science started with a chemistry set

and a lot of questions, so keep investigating!

Design your own:

Now that you have observed what happens when a candy is placed in a plate of room-temperature water, consider other variables and tweak the design of the experiment to test different variables.

In scientific inquiry a "variable" is something that can affect the outcome of the experiment. Think about the different variables that may affect how the candy coating dissolves in water:

- color of the candy coating
- the number of candies on the plate
- the temperature of the water
- adding sugar to your water solution

Are there any other variables you can think of that you can test? What else could you change about the water you use to cover the candy?

Based on the variables above, formulate new questions and consider how you can alter the design of the basic experiment to test for each variable and answer your new question. Some suggested questions may be:

- What happens if I make the water hotter?
- Does every color dissolve at the same rate?
- What happens if there are multiple candies on the same plate?
- What happens if I change the depth of the water?
- What happens if the water is sweet or salty?

As you change the design of your experiment to investigate the effect of an individual variable, keep track of your change and results so you can compare and analyze them. Additional materials you may need as you alter the basic experiment to answer your new questions may be:

- Clear plastic containers (like small deli cups or drink cups)
- Hot tap water
- Cold water
- Quarter or other small circular object to trace circles
- Plastic cups of different sizes to trace circles
- Permanent marker

- Measuring tape or ruler
- Sugar or salt
- Teaspoon

Notes:

- Be careful when handling hot water.
- If you want to see if one color dissolves faster than another, create boundary lines on your plate using a permanent marker to trace circles onto the plate (like a target) around a centered dot. Different colored candies will be placed on the center dot of each plate.