

Secret Marshmallow Messages With Ghostbusters



**IMPOSSIBLE
SCIENCE**

Goal: Students will be able to witness and explain the Maillard reaction through a marshmallow demonstration.

Background Information

Maillard Reaction: Louis Camille Maillard- French chemist who first discovered and documented the reaction between proteins and sugars when they are heated.

We sped up the reaction with the baking soda and egg whites, speeding up the reaction in the area where the mixture rests.

Hook

Toast a few pieces of bread as students are entering the classroom. Ask students to write down what they smell. Share a few responses and ask why a plain piece of bread wouldn't smell so good.

Procedure

1. Explain to students that a chemical reaction occurs when bread is heated, causing it to not only brown, but also to emit scents and flavors. This chemical reaction is called the Maillard reaction, as it was first discovered and documented by French chemist Louis Chamille Maillard. It occurs when amino acids, which are the building blocks of proteins, and simple sugars interact with each other.
2. Ask students: If you wanted to speed up the browning process caused by the Maillard reaction, what could you add to the base food? What might you brush

Materials:

- White bread
- Toaster
- Large marshmallows
- A small bowl
- 2 tablespoons of water
- 1 tablespoon of egg whites
- 1 tablespoon of baking soda
- Q-tips or small clean paint brushes
- Cookie sheet covered in tinfoil
- Oven or toaster oven

on top of a croissant to speed the browning? A few students should share that an egg wash is often added- explain if not. Then ask, "Knowing what you know about the Maillard reaction, what must the egg contain that speeds up the browning?" Students should turn and talk, then share guesses. Explain that egg is rich in amino acids, which react with the sugars in the dough.

3. Explain that today students will create a Maillard reaction to create secret messages on marshmallows.
4. Show Impossible Science video, pausing for students to jot down notes on the Maillard reaction.
5. Hand out marshmallows and supplies to students and guide them through the steps:
 1. Preheat oven to 350 degrees.
 2. Mix together the water, egg whites, and baking soda.
 3. Dip the paintbrush or q-tip into the mixture and paint your message or image onto the marshmallow.
 4. Place painted marshmallows on the cookie sheet.
 5. Heat on 350 for a few minutes, watching to make sure they don't burn.
 6. Remove to reveal the message.

Assessment:

Students should cook a dish at home that results in the Maillard reaction. Explain the reaction to the class while sharing photos, video, or a sample of the final dish.

Safety Note:

- Adult Supervision Recommended

