SEAWEED GUMMIES

This experiment uses sodium alginate powder to illustrate the concept of cross-linking of polymer chains.

BACKGROUND INFORMATION:

Bounty from the Sea

Sodium Alginate is a naturally occurring polymer that is extracted from giant kelp and other brown seaweeds that grow in the ocean coastlines of North and South America, New Zealand, Australia and Africa. Kelp is known for its high growth rate, growing up to a half a meter a day. The kelp is mixed with water and salts to extract the sodium alginate polymer.

Culinary Uses

Sodium alginate is commonly used in the food industry. It acts as a thickener and emulsifier for salad, pudding, jam, tomato juice, and canned products. It is a hydration agent for noodles, bread, cool and frozen products. It is also used as a stabilizer for ice cream, yogurt, cream, and cheese. Sodium Alginate and Calcium Chloride can be found at cooking supply stores online.

As with any kind of cooking project, make sure you start with safe ingredients and clean tools.

MATERIALS NEEDED:

Food grade Sodium Alginate
Distilled water
Digital scale minimum 0.1 grams increments
Food coloring
Portion cup
Spoon or small strainer
Calcium Chloride ($CaCl_2$)
Tap water
Blender (classic or immersion)
Flavored simple syrups
Several small bowls
Pipette or eye dropper

PRE-ACTIVITY PREPARATION

Making the alginate solution

Alginate powder is very difficult to mix into water by hand, but a blender makes this prep easy.

- Measure 250 grams of distilled water and pour into a classic blender.
- Put the blender lid on, but take off the center handle.
- Turn the blender on and slowly pour in 2.0 grams of alginate powder
- Blend until thoroughly mixed (about 30 seconds).

Pre-Activity Preparation Continued…

Making the calcium chloride solution (activation solution)

- Measure 500 grams of water (tap water is fine for this step).
- Add 2.0 grams of calcium chloride and stir until dissolved.

Making flavored simple syrups

- Measure out 1.5 parts sugar to 1 part water
- Pour into a saucepan and stir well
- Place the saucepan over medium heat and heat until the liquid is clear and no longer cloudy
- Remove from the heat source. Divide liquid into batches and add flavoring to taste. Let cool
- Store simple sugars in an airtight container in the refrigerator for up to -2 weeks

WHAT TO DO:

- Pour the calcium chloride solution into a small bowl and set aside. This is your activation solution.
- Pour plain water into another bowl and set aside. This will be used for rinsing your completed gummies.

Personalizing your Alginate Sample

- Pour a small amount of alginate solution into a portion cup
- Mix in a small amount of flavored simple syrup
- Add a drop of food coloring and mix thoroughly for colored gummies (skip this step if you want them to be clear)

Making Gummies:

To make gummy eggs or worms, use an eyedropper or pipette to drip drops or squirt the flavored alginate solution into the calcium chloride solution. The worms or spheres should form instantly. The outside will be gelled while the inside will still be liquid. Use a spoon or strainer to remove the gummies from the calcium chloride solution. Rinse in plain water before consuming.

OPEN EXPLORATIONS:

Experiment with different variables in making the gummies:

- How does the time the alginate is left in the calcium chloride solution before rinsing impact the final gummy? What "soak time" makes the best gummy to you?
- Instead of a dropper, explore other means of distributing the alginate solution into the calcium chloride solution. How would a colander or sifter change how the gummies turn out?

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