



Seaweed Spheres instructions

Deeper Blue - National Science Week
Changemaker Challenge

One of the greatest contributors of plastic pollution in our oceans are single-use plastics. The plastic is generally derived from non-renewable sources and if disposed of improperly can litter our coasts, entangle wildlife and disrupt the health of whole ecosystems.

One alternative that addresses some of these issues is seaweed-based polymers. In this challenge our science star Dr Julia Reisser, will guide you to making plastic free “water bottles” or “seaweed spheres” in your own home.

The primary ingredient is sodium alginate which is derived from seaweed. The bubbles are 100% edible, entertaining and environmentally friendly!

Instructions

Also see the VIDEO instructions: https://youtu.be/t1neNx_na5Q

Materials

- Bowls or containers - 300ml (cup) up to 1000ml (jug)
- Measuring spoons - 5ml (teaspoon) to 15ml (tablespoon)
- Handheld blender - preferably electric
- Sieve or slotted spoon - to scoop out drips and drops

Ingredients

- Sodium Alginate
- Calcium Chloride (CaCl)
- Water - distilled or low mineral content is better
- Food dye - optional, though recommended
- Flavouring - optional, if you want the spheres to taste better

Preparation

The basic process is to create a CaCl solution into which you drip or drop Sodium Alginate solution. The amount you drip or drop determines the size of your spheres. Read all the way through the instructions before starting.

1. Create 1% Calcium Chloride solution

- Pour water into the LARGEST container e.g. 1000ml (jug)



- Use a spoon to 10g / 10ml CaCl into 1000 ml of water. If you have a smaller amount or container, keep the ratio ~ 1% i.e. 1g / ml CaCl per 100ml water
- Use the blender to mix thoroughly - may take ~ 1 minute

2. Create the Sodium Alginate solution

- Pour water into the SMALLER container e.g. 300ml (cup)
- Add food dye and / or flavouring. 3-5 drops of colouring is plenty.
- Use a spoon to measure 3g / 3ml into the 300ml of water. If you have a smaller amount or container, keep the ratio ~ 1% i.e. 1g / ml per 100ml
- Use the blender to mix thoroughly - may take ~ 1-2 minutes
- The Sodium Alginate solution should both be bubbly and start to get sticky. Once blended let the bubbles settle

3. Add Alginate to CaCl solution. Choose your size

- **Option 1** - Drips. You can use a spoon, pipette or straw to drip the alginate into the CaCl. It will quite instantly form into small spheres.
- **Option 2** - Drops. Use spoons or a scoop to gently drop a large blob or drop. It will take longer to form and set in than the small spheres, so let it soak for 1-2 minutes.
- Option 3 - As you wish! Try bigger scoopes

4. Eat!

- You can eat these perfectly safely. If you don't have flavouring they may taste a little 'salty'!

More:

Gastronomy

You can use the same process and substitute CaCl with Calcium Lactate to make 'caviar' and other 'molecular gastronomy' delights.

Chemistry

Sodium alginate is the sodium salt of alginic acid, a polysaccharide used by brown algae to support its cell walls, similar to the way plants use cellulose. It is extracted from seaweed and used widely in food and medicine. Each repeating sugar monomer in the structure carries a carboxylate anion with a balancing sodium cation.

Once dipped into the calcium chloride solution, calcium ions begin to displace sodium ions from the alginate and exert a greater electrostatic attraction on the carboxylate anions on



neighbouring chains. These interactions create cross-links between the chains, forming a gel.