



Gummy Shapes

How can things build themselves?

Try this!



Put the strainer into the bowl of salt water. Gently squeeze the bottle of goo so that little droplets fall into the strainer.

Tip: Don't squeeze too hard! Make little droplets, not worms.



Lift the strainer out of the water and feel the goo. Is it still liquid?

Now, try squeezing one of the little balls. What happens?

When the goo touches the salt water, a chemical reaction occurs. This reaction creates a gummy shell on the outside out of the droplets.

What's going on?

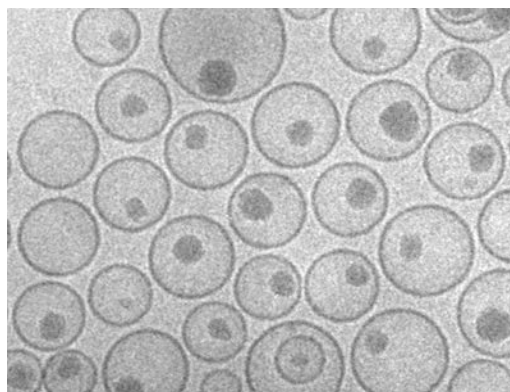
When the liquid goo comes into contact with the salt water, a chemical reaction takes place and makes a *polymer*. A polymer is a long chain-like molecule made up of many repeating units linked together. The polymer forms on the outside surface of the goo, creating a gummy shell around the liquid interior.



The salt water is a solution of calcium chloride. The liquid in the squirt bottle is sodium alginate, a polysaccharide with many short polymer molecules. The calcium ions in the salt water cross-link (bond) these short polymer molecules into longer strands, turning the sodium alginate liquid into a thick gel.

How is this nano?

The polymer droplets you made are similar to *nanocapsules*, tiny particles with an outside shell and a hollow interior that can be filled. Nanocapsules are very, very small—less than 100 nanometers across. (A nanometer is a billionth of a meter).



Nanocapsules filled with cancer medication

To make nanocapsules, scientists use a process called *self-assembly*, in which nanostructures actually build themselves! Nanocapsules can be designed to deliver cancer medicine to diseased parts of the body (tumors), bypassing healthy parts. These targeted delivery systems use much less medicine, so they can have fewer and less harmful side effects.