



**Who says all the fun has to happen at The Tech Interactive?
This DIY biotinkering activity can be done with inexpensive
store-bought supplies and things you find around your home!**



Introduction

Did you know that the seaweed you've seen in the ocean or even eaten as a snack is inspiring innovators to imagine new materials? Large brown algae, like kelp, contains polymers — long chains of molecules — that are more environmentally friendly than the ones in most plastics. These natural polymers (alginates) could eventually be used to create sustainable everyday objects. Try your hand at using a bit of chemistry to turn biodegradable polymers from algae into your own custom string!

Design Challenge

Make your own colorful string using polymers that come from algae. Then craft fun creations with your algae string!

Learn More



[What's the Chemistry?](#)



[Algae String Essential Questions](#)

Such as... will this clog my sink?

Subject:

Biodesign, Chemistry, Materials Science

Age:

8+

Time:

Prepare gel: 1 hr-1 day
Make string: 30 min
Create: 30 min-4 hours

Key Concepts:

Polymers, chemical reactions, biomaterials, fiber arts

Materials

You will need two special ingredients, **sodium alginate** (algae polymer) and **calcium chloride**. These are the chemistry superstars that react together to form a new material! You'll also need some basic kitchen equipment and supplies to customize your string. We have included our favorite suggestions below to get you started, but use whatever you have on hand — be creative!

Gel Preparation Supplies				
Mixing Container (Choose one)	Sodium Alginate (1 tsp)	Water (½ cup)	Texture Ingredient (1-3 tbsp)	Color Ingredient (up to 1 tsp)
<ul style="list-style-type: none"> Squeezable bottle Jar or cup Plastic baggie Bowl Food storage container 	<p>Use a powder. Find online, or at specialty grocery stores and pharmacies.</p> 	<p>Bottled or filtered tap water is strongly recommended, if you have it.</p> 	<ul style="list-style-type: none"> Honey Corn syrup Pancake syrup Aloe vera Vegetable glycerin 	<ul style="list-style-type: none"> Food coloring Powdered drink mix Natural pigments like turmeric Juice from fruits and vegetables like red cabbage or berries 

Note: Some Mixing Containers will need a utensil to stir. Some can double as a Dispensing Tool.

String Making Supplies				
Bath Container (Choose one)	Water (2 cups)	Calcium Chloride (2 tsp)	Dispensing Tool (Try one or several)	
<ul style="list-style-type: none"> Bowl Food storage container Pan Baking dish 	<p>Any type, including tap water, will work.</p> 	<p>Find online or at brewing supply stores.</p> 	<ul style="list-style-type: none"> Squeezable bottle Jar or cup Plastic baggie Piping bag Syringe (without a needle) 	

Note: Bath Container should be large enough to reach into and make a bath that is at least one inch deep.



Why filtered water?

Many homes have hard water, which has minerals like calcium. Since calcium is used in the chemical reaction, your algae gel could solidify too soon!

Why texture ingredients?

These sticky substances help keep your string from becoming stiff and breakable.

Why a dispensing tool?

This handy tool will help you shape your gel before you transform it into a solid string. Remember some mixing containers can also be used as dispensers.

Instructions

Part 1: Prepare your algae gel (1 hr-1 day)

The basis of your string will be algae gel, a gooey combination of ingredients you mix to your own specifications. Watch how your adjustments to the color and texture affect your string later!

1. Choose the texture and color ingredient(s) you want to use to customize your algae string. Add them to a mixing container with water and mix to combine.

½ cup	 Water (filtered or bottled recommended)
1-3 tbsp	 Texture Ingredient(s) (honey, etc.)
Up to 1 tsp	 Color Ingredient(s) (food coloring, etc.)



Make more batches to experiment with different combinations or multiple ingredients!

2. Add in the sodium alginate powder. Mix until a thick gel begins to form (about 5 min).

1 tsp	 Sodium Alginate Powder
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3. Your algae gel will be ready to use when there are no more powder clumps.

Excited to make string right away? Mix by hand.	Tired of mixing? Let it sit overnight.
<ul style="list-style-type: none">• Continue to actively mix your gel until all clumps have broken up and dissolved.• This will take some effort and time (30 min or more), but can be a fun challenge!• The air bubbles trapped in your gel won't have time to escape, which may weaken your string.	<ul style="list-style-type: none">• Clumps will finish dissolving by themselves as your gel rests.• Seal or cover your container to stop your gel from drying out while it sits.• This extra time also allows air bubbles to escape, which can strengthen your string.

Part 2: Make your algae string (30 min)

It's time to use chemistry to change your gooey gel into a solid string. The chemical reaction will start when the alginate in your algae gel meets the calcium in your calcium bath.

1. Combine water and calcium chloride in your bath container and mix to make the calcium bath. (You can reuse your bath for several batches of string.)

2 cups	 Water (any type)
2 tsp	 Calcium Chloride

2. Transfer your algae gel into a dispensing tool of your choice.
3. Use your dispensing tool to add your algae gel to the calcium bath.
 - Depending on the tool used, pour your gel from above or push it through a small opening, like squeezing toothpaste from a tube!
 - To avoid clogs, keep your dispensing tool from touching the bath.
4. Let your string sit in the calcium bath for a few minutes before removing.
 - Give it a test squeeze. If it isn't as solid as you want, put it back in to soak longer.

Activity Tips



[Algae String Tool Chest](#)

How tools affect your gel and string.



[How Dried String Changes](#)



Part 3: Create some custom algae string creations! (30 min-4 hours)

See what you can make with your algae string! Can you tie it into a bow? Or use knots to make a bracelet? Try using it to knit or weave an awesome creation!

Like your wet string? Start creating!	Want something more stable? Let your string dry.
<ul style="list-style-type: none">• Use it to make fun creations, but proceed with caution: Fresh string is fragile!• Your creations will change as the string dries out.	<ul style="list-style-type: none">• Drying can take a few hours or more, but stretching out your strings and using a fan can speed things up.• Dried string creations stay the same for months!

 You can dispose of leftover algae gel and unwanted string in the trash. Pour your calcium bath down the drain.

Explore More

- **Customize!** Make multiple batches of string that are different colors, shapes, or thicknesses. How about a more stiff or flexible string?
- **All strung out?** Make a 2D creation! Trace your algae gel into a pattern on a plate, then gently pour your calcium bath around it until it's completely covered. What other creations can you make?
- **New tools.** Use materials from around your house to build a new type of dispensing tool. What kind of string does it make?

Get Inspired!

 [Algae String Ideas](#)

 [Algae String Mizuhiki Knots](#)
Tie your own!



Share Your Results! Keep us posted on social media with [#TheTechatHome](#).



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