

ACTIVITY: Hunting for Algae

How often do you interact with algae and not realize it?



DISCOVER

How often do you interact with algae? Believe or not, you use products made from algae every day! In this activity, students will analyze the ingredient of foods and beauty products to discover which products contain algae.

MATERIALS

This activity focuses on finding materials that contain algae. These products are available wherever packaged foods and manufactured goods can be found. Good places to start include a kitchen, bathroom, or grocery store.

PREPARE

In the classroom: The day before you do this activity, assign students to search their cupboards and refrigerators at home for products that contain algae. Have them bring in the product, packaging, or a picture or list of items that contain algae.

In the home: If you are already at home, just head to the kitchen!

PONDER

- How many food and household products use algae?
- Why would algae be used in so many common products?
- How does an algal cell produce the chemical compounds used in these common products?

Grades: 5th—12th

Group Size: 1–30 students

Time: 10 minutes if supplies are already gathered. 30—60 minutes if searching cabinets or refrigerators for items.

Utah Core Curriculum:

- 5th Science 1.3 c
- 7th Science 1.3 b, c, d
- 8th Science 1.4 b, c; 2.1 a, b
- Chemistry 4.1 f
- Science Intended Learning Outcome 5.a (7th, 8th, Chemistry, & Biology)

Process Skills & Higher Level Thinking Skills:

- Investigating

Related Activities/ Exhibits:

- Photosynthesis

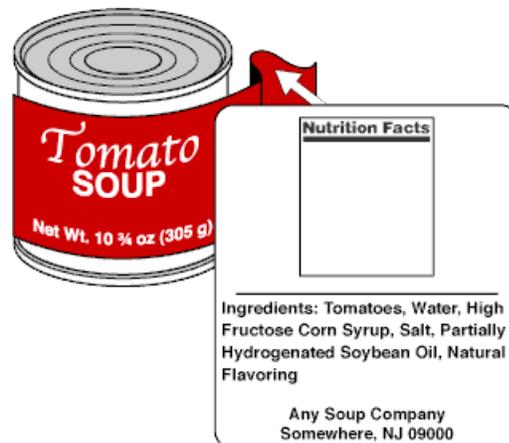
WHAT'S GOING ON?

Through the process of photosynthesis, algal cells convert carbon dioxide into sugars. These sugars form a thick, gel-like substance that gives shape to algae cell walls. Once extracted from the cell walls, these sugars can be used in products that need a creamy, gummy, or plastic-like texture. In the food industry, alginate (usually extracted from seaweed) is used as a thickening agent and a foam stabilizer to maintain the creamy texture of dairy products. Carrageenan is another form of algae used in this same way. Propylene glycol alginate thickens acid foods like soda pop, salad dressing, and the foam in beer. Calcium alginate is thick like jell-o and can be used in science laboratories to trap and study proteins, to grow bacteria or fungi in petri dishes, to encapsulate drugs in a pill form, or to create a type of bandage for wounds. Sodium Alginate and Sargassum are used as emulsifiers in the food and textile industry, which means they can hold fat and water together so things don't split into two layers. They can also create fibers durable enough for a firefighter's fire-proof clothing. Sargassum is also used as a fertilizer, an additive in soy sauce, a treatment for goiters, and a common vegetable in Japan.

In addition to sugars, algae cells produce oils. Fossilized algae contribute to the petroleum we mine from the earth. So, in essence, algae contributes to any petroleum-based products: from the gas that moves your car, to the plastics in your cell phone, to the Vaseline in your chapstick.

EXPERIMENT

1. Search your cupboards for products that may contain algae. Below is a list of products that commonly contain algae, but feel free to find your own to add to this list.
 - sushi seaweed sheets
 - pastries
 - jelly
 - ice cream
 - processed cheese (cream cheese, cheese whiz, mac 'n'cheese, American cheese)
 - candy
 - yogurt
 - sour cream
 - mayonnaise
 - margarine
 - frozen dairy desserts
 - canned frosting
 - whipped cream
 - imitation orange pulp
 - soda pop
 - salad dressing
 - gravy
 - hot chocolate mix
 - brownie mix
 - toothpaste
 - fish food
 - dog/cat food
 - medicine
 - lotion
 - paint
 - gasoline
 - anything made with a petroleum bi-product (vaseline, motor oil, asphalt, propane, wax, lubricating oils, etc)
 - oxygen (algae produces a large portion of the oxygen we breathe)
 - dental molds
 - agar plates
 - bandages
 - ink
 - firefighter's fireproof clothing
 - fertilizer
2. Find the ingredients list. All packaged foods, cleaning supplies, medicines, and beauty products have a list of ingredients on the side. It's usually fine print, so pull out a magnifying glass if needed!



How does algae contribute to the air you breathe? Through the process of photosynthesis, algae produces oxygen. Scientists estimate that algae (primarily in the oceans) produce 73%-87% of the oxygen for the planet.

(Possible Fix For Global Warming? Environmental Engineers Use Algae To Capture Carbon Dioxide, Science Daily, April 1, 2007. http://www.sciencedaily.com/videos/2007/0407-possible_fix_for_global_warming.htm)

3. Identify the algae. Algae comes in many forms and its products are identified by names such as: alginate, calcium alginate, alginic acid, sodium alginate, propylene glycol alginate (PGA), carrageenan, beta carotene, agar, sargassum, guluronic acid, and mannuronic acid. Look for these terms in the lists of ingredients on the products you selected.

EXPAND

These large chains of sugar can create polymers. A polymer is a huge molecule with many repeating smaller parts. The most common algae-based polymer is calcium alginate, which is a gooey, plastic-like substance made up of many six-carbon sugar rings all bound together in large chains. See the attached diagram for a molecular structure of calcium alginate. Our world is full of polymers, including plastics, polyester, and even DNA!