Biodegradable Algae Plastic

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The Biodegradable Algae plastic project was designed to find a solution for the world's aggressive plastic waste problem. After doing research on potential materials, it was found that Chondrus Crispus (a species of Irish sea moss) contains a large amount of carrageenan, a natural biopolymer. I then developed my hypothesis, if biopolymers extracted from algae and natural plasticizers are combined in a certain ratio, then a biodegradable, plastic-like material can be created because of the petroleum-like properties carrageenan from algaes has. Once ingredients were established, I created my recipes. Each test (of three) would contain water, vegetable glycerin, tea tree oil (antibacterial), and dried, ground irish seaweed. To develop the bioplastic, I added ingredients to a small saucepan and brought it to a simmer, added the dried sea moss, and reduced to low heat. This mixture then sat on low heat for 20 minutes being stirred each minute before being spread across parchment paper until it was 1/8th of an inch thick. It was then left to cure in a dry, room temperature space. Before testing, each sheet was cut into 1x5 in. strips. Each strip was tested on flexibility and to what degree it would bend without breaking (1-180 degrees), and overall strength (when weight was applied). After testing I found that my first test (containing 15 g of seaweed) had moderate flexibility and strength, my second test (18 g of seaweed) had low flexibility but high increased strength, and finally my third batch (12 g of seaweed) had high flexibility but the least strength. After examining the data, I found that my hypothesis was correct. By changing the polymer to plasticizer ratio, multiple different strengths and flexibilities in a bioplastic could be achieved.

Awards Won: