



Space Plastics

A spaceship made of plastic?! Explore new technologies developed by NASA and engineer your own bioplastic sample.

TEKS:

SCI 4/5/6.4: Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation for society.

SCI 4/5.4.A: The student is expected to explain how scientific discoveries and innovative solutions to problems impact science and society.

SCI 4.6.A: The student is expected to classify and describe matter using observable physical properties, including temperature, mass, magnetism, relative density (the ability to sink or float in water), and physical state (solid, liquid, gas);

SCI 4.11: Earth and space. The student understands how natural resources are important and can be managed.

SCI 4.11.A: The student is expected to identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas.

SCI 5.6.C: The student is expected to compare the properties of substances before and after they are combined into a solution and demonstrate that matter is conserved in solutions.

SCI 5.11: Earth and space. The student understands how natural resources are important and can be managed. The student is expected to design and explain solutions such as conservation, recycling, or proper disposal to minimize environmental impact of the use of natural resources.

Materials:

- 2 Drops food coloring (any color)
- 2 Drops corn or vegetable oil
- Microwave
- 1 Tablespoon cornstarch
- 1 Tablespoon water
- Sandwich-size plastic baggie

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How To:

1. Place the cornstarch, corn oil, water, and food coloring in the baggie and seal it shut.
2. Use your hands to squish the ingredients until they are mixed well.
3. Once the ingredients are mixed thoroughly, slightly open the baggie to allow ventilation and microwave for 20-25 seconds.
4. When it is done, remove the baggie from the microwave very carefully, as it will be very hot.
5. Allow the material to cool, then remove it from the baggie to make observations.

STEM Explanation:

Think back to the solution of cornstarch, corn oil, water, and food coloring before it was heated in the microwave. Would you ever use this material to build anything? Do you think you could use it to build a spaceship? *Probably not!*

Did the ingredients in the baggie change after you microwaved them? Would you ever consider using the heated solution to build a spaceship? *Possibly.*

The cornstarch, water, corn oil, and food coloring combined to create a hard, plastic-like substance called a bioplastic. Plastics are very popular in space travel because they are lightweight and strong. Plastics are polymers, which means that they are made up of repeating chains of the same molecules. These chains link together and make plastics very strong. Bioplastics are plastics made from living materials, like plant starches, cellulose, oils, or proteins. These bioplastic ingredients are renewable, meaning they can be easily replenished. And unlike other plastics, bioplastics are biodegradable. This means that they are capable of being broken down through the actions of living organisms and natural processes over time!

Did you know that NASA helped invent scratch-proof plastic lenses, water filter systems, cordless vacuums, and even the memory foam inside some of their mattresses, pillows, and shoes!? NASA has teams of scientists and research engineers constantly working to make more efficient and affordable solutions for space travel and exploration! Plastics are very popular, and bioplastics are a much more eco-friendly option for the future of space travel.

Career:

Research engineers work in many fields to develop products, processes, or technology for their employers. They gather relevant information, data, and samples, and then analyze their research to create innovative solutions.

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Resources:

https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=141&author_state=0&grade=3

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https://science.nasa.gov/science-news/science-at-nasa/2005/25aug_plasticspaceships

<http://science.howstuffworks.com/innovation/inventions/top-5-nasa-inventions2.htm>

https://spinoff.nasa.gov/Spinoff2008/tech_benefits.html

<http://list25.com/25-coolest-nasa-discoveries-that-changed-your-life/5/>

<http://www.livescience.com/34572-velcro.html>

<https://en.wikipedia.org/wiki/Plastic#History>

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