Trash Troop: tackling trash together!

Starch Plastic

Bio-plastic Activity

Goal

Teach students about alternatives to fossil fuel-based plastics by using plant-based starches to make a "bio-plastic" cup or bowl.

Introduction

Today, over 99% of plastics in the world are made from fossil fuels (Center for International Environmental Law) and the majority of them end up in landfills or the ocean where they cause issues as they slowly degrade and leach toxic substances into the environment and pose as threats to wildlife. "Bio-plastics" are a bio-degradable alternative to fossil fuel-based plastics as they are able to decompose in as little as 4 to 6 weeks because they are made only using plant-based materials. Use the following supplies and instructions to make a "bio-plastic" bowl or cup with your students!

Next Generation Science Standards

Practices

- Planning and Carrying Out Investigations

Core Ideas

- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions

Crosscutting Concepts

- Influence of Science, Engineering and Technology on Society and the Natural World
- Structure and Function

Supplies

- Cooking pot/pan
- Spatula
- Corn starch
- Aluminum/parchment paper
- Measuring spoons
- Scissors
- Vegetable Glycerin
- Hot plate or stove
- White Vinegar
- Tap Water
- Food coloring
- Cheesecloth
- Vegetable oil
- Molds (glass/plastic cup, glass/plastic bowl, etc.)

Instructions

1. Cut out a piece of cheese cloth big enough to fit your mold of choice. Cover the mold in a thin layer of vegetable oil to make it easier to remove the "bio-plastic" from the mold once it has set.

2. Combine 6 tablespoons of water, 1 tablespoon of cornstarch, 2 teaspoons of vinegar, and 2 teaspoons of glycerin in the pot or pan while everything is still at room temperature and stir to form a milk-like mixture.
3. Once combined, turn heat on to medium heat and stir to dissolve the clumps.
4. Once the clumps are dissolved and the mixture starts to thicken, turn the heat down to low and continue to stir.
5. Keep stirring on low until the mixture is mostly clear/see-through and let boil for about 5 minutes.
6. Once the mixture is see-through remove from heat and mix in food coloring.
7. Once the mixture has cooled down enough to be bearable to the touch (around 2 minutes), saturate the cheese cloth with the mixture and wrap the cheesecloth around the mold and let dry for 24 hours on the aluminum foil or parchment paper.
8. Use scissors to cut the excess "bio-plastic" off the mold and carefully peel the "bio-plastic" off the mold.

Discussion

- How does this "bio-plastic" compare to fossil fuel-based plastic?
- What sort of everyday materials could be made using "bio-plastic" instead of fossil fuel-based plastics?

References

Fossil Fuels and Plastic
https://www.ciel.org/issue/fossil-fuels-plastic/