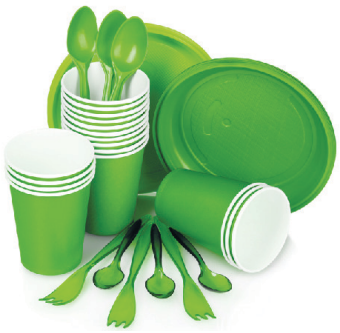
Lesson to Grow

Making Bioplastics



Description:

Common plastic is made from petroleum, a fossil fuel and non-renewable resource. Increasingly, plastic products are being made from biomass which is made from renewable resources, often byproducts of agricultural processes.
In this activity students make a simple bioplastic from corn starch. This lesson also provides an opportunity to discuss the advantages and disadvantages of bioplastics and how we use of our natural resources.

Background:

Bioplastics are a type of plastic made from renewable, biological materials like starches, cellulose, oils or proteins. They generally contain little to no petroleum and therefore are usually biodegradable. When bioplastics are exposed to the environment (sunlight, heat, water, microorganisms) they breakdown into non-toxic compounds like carbon dioxide and water. Additionally, unlike petroleum-based plastics, bioplastics are made from renewable resources. These resources are typically agricultural byproducts, like cornstarch and potato starch, tapioca starch and casein (milk protein). Byproducts in agriculture refers to secondary products created from a crop.

Directions:

1. Divide students into groups and give them the supplies for making their bioplastic. For younger grades, demonstrate the process to the students, asking them to hypothesize at the various stages what will happen and imagine what can be made from bioplastic. Older students can follow the directions and answer the questions on the attached worksheet.
2. To make the bioplastic, place the following ingredients in a plastic plastic bag: 1 tablespoon of cornstarch, two drops of corn oil, one tablespoon of water and 2 drops of food coloring.
3. Seal the bag and gently mix the cornstarch mixture by rubbing the outside of the bag with your fingers until combined.
4. Open the bag slightly, making sure it can vent. Place the bag upright in a microwave oven on high for 20-25 seconds.
5. Carefully remove the bag from the microwave and let it cool for a few minutes. While it is still warm, students can try to form their plastic into a ball. Observe what it does.
6. Have students complete the worksheet, then discuss the experiment. Ask them to describe their plastic; did it turned out different with others; and name three things they could make with bioplastic.

Biodegradeable bioplastic breaking down over time.

Grade Level: 1-7

Essential Skills: 1, 2, 5, 6, 9

NGSS: Partially meets 2-PS1-2, K-2-ETS1-2.

CCSS: RI.1.1, RI.1.7, W.1.7, RI.2.1, RI.2.8, W.2.7, W.2.8, RI.3.1, W.3.2

Social Sciences: 1.12, 1.21, 3.12, 4.13, 5.11, 5.22

Math: MP.2, MP.4, MP.5

Time: Full class period

Materials:
Each group of students making bioplastic will need the following: tablespoon; cornstarch; corn oil; food coloring; water; plastic bag; worksheet

AITC Library Resources:
Check out these materials online at AITC's Free Loan Library:
Instructional Unit: Bringing Biotechnology to Life
Books:
Worms Eat My Garbage
Soul of Soil
More Lessons:
Source Relay
Water Filteration
Vocabulary:
Biodegradable: a material able to break down into harmless products through the action of living organisms or natural processes.

Source: *Science in Residence Program*

Nombre:_____

Haciendo Bioplástico

Materiales:

Maicena
Agua
Aceite de maízl
Colorante vegetal
Cucharas medidoras o contenedores
bolsa de plastico

Instrucciones: Parte 1

1. Mide 15 ml (1 cucharada) de maicena o fécula de maíz en la bolsa de plástico.

2. Agrega 15 ml (1 cucharada) de agua a la maicena.

3. Agrega 2 gotitas de aceite de maíz a la mezcla en la bolsa.

4. Agrega 2 gotas de colorante vegetal a la mezcla. Puedes mezclar dos colores primarios si así lo deseas.

5. Sella la bolsa y aplasta suavemente para mezclar todo. Asegúrate de que tu mezcla esté bien incorporada.
Describe la mezcla en tu bolsa de plástico: _____

_____

¿Cómo se siente al aplastar la bolsa lentamente? _____

_____

¿Se siente diferente cuando la aplastas rápido a diferencia de aplastarla lentamente? _____

_____

¿Tu mezcla es líquida o sólida?_____¿Qué pasará cuando la cocines?_____

Instrucciones: Parte 2

6. Asegúrate de dejar la bolsa un poco abierta para que el vapor salga. Coloca la bolsa abierta en el microondas y cocina tu mezcla a alta potencia durante 20 segundos. ¡Ten cuidado! - ¡El plástico se calentará!

7. Déjala enfriar por unos minutos. Mientras se enfría contesta las siguientes preguntas.

¿Cómo se ve tu nueva sustancia? ¿En qué se diferencia de la mezcla con la que empezaste?

_____

_____

Si tu plástico esta frio, amásalo con las manos. ¿Como se siente? Describe sus otras propiedades.

_____

_____

¿Qué podrías hacer con tu bioplástico? ¿Qué no podrías hacer con él? ¿Por qué?

_____

_____

¿Qué se usa para hacer bioplástico? _____

_____