

LAB: BIOPLASTICS

STATION 1: PACKING PEANUTS

Background: Corn can be used to make a type of plastic known as **bioplastic**. Commonly, plastic is made from petroleum, a fossil fuel that is a **nonrenewable resource**. In contrast, bioplastic is made from biological materials—plant starches, cellulose, oils, or proteins. Unlike petroleum-based plastics, bioplastics are made from renewable resources such as corn, potatoes, tapioca, and casein (milk protein). One example of a bioplastic application is packing peanuts—the loose fill that goes all over when you open a package. Some packing peanuts are made of polystyrene (Styrofoam), which is a petroleum-based plastic. Corn-based packing peanuts are made of over 99% cornstarch and a very small percentage of food-grade oil. These packing peanuts are non-toxic, biodegradable, and **compostable**.

It is important to note that there are pros and cons to both bioplastics and petroleum-based plastics. There are also some common misconceptions about the differences between these groups of plastics. For example, both bioplastics and petroleum-based plastics can be **biodegradable**, meaning that over time they break down. Also, some bioplastics are **recyclable**. The ability of a plastic to be recycled or to biodegrade depends on the chemical structure of the plastic, not whether the plastic is made from renewable or nonrenewable materials. In addition, many people are unaware that the raw materials used to make petroleum-based plastics are the by-products of refining crude oil for fuel. If these by-products were not used to make plastics, they would be industrial waste that would need to be disposed of.

Materials: plastic beaker, spoon, 2 pink packing peanuts, 2 white packing peanuts.

Procedures:

1. Fill beaker half full of water.
2. Place 2 **pink** packing peanuts in beaker and stir for 1 minute.
3. Record observations in data table.
4. Dispose of any packing peanut waste in trash.
5. Rinse out beaker and fill half full of water.
6. Place 2 **white** packing peanuts in beaker and stir for 1 minute.
7. Record observations in data table.
8. Dispose of any packing peanut waste in trash.
9. Rinse out beaker.

Data:

Type of packing peanut	Observations
Pink	
White	

Analysis:

1. What is plastic normally made from?
2. What is bioplastic made from?
3. What are the pink packing peanuts made from?
4. What are the white packing peanuts made from?
5. What are some PROs of BIOPLASTIC packing peanuts?
6. What are misconceptions of about the different plastics?
7. What are some PROs of petroleum-based plastics?

STATION 2: MAKING BIOPLASTIC

MATERIALS: Cornstarch, water, corn oil, food coloring, Ziploc bag, tablespoon

PROCEDURES: Part 1

1. Measure 1 tablespoon of cornstarch into your plastic bag.
2. Add 1 tablespoon of water to the cornstarch.
3. Add 2 small drops of corn oil to the mixture in your bag.
4. Add 2 drops of food coloring to the mixture in your bag.
5. Seal the bag and squish it gently to mix everything together.

Analysis:

1. Describe the mixture in your plastic bag:
2. How does it feel when you slowly squish the bag?
3. Does it feel the same when you squeeze the bag quicker/harder?
4. Is your mixture a solid or a liquid? Explain your choice.

PROCEDURES: Part 2

1. Microwave your mixture on high power for 20 seconds. Be sure to leave the bag open a tiny bit so that steam can escape. Be careful, the plastic will be hot!
2. Let it cool for several minutes. While it is cooling answer the questions below.

Analysis:

1. What does your new substance look like? How is it different from the mixture you started with?
2. If your plastic is cool, knead it with your hands. What does it feel like? Describe its other properties.
3. What could you make with your bioplastic? What couldn't you make? Why?
4. What is used to make bioplastic?