

corn

TO PLASTIC

Polylactic Acid (PLA)

Grow & Harvest:

Field corn is grown and harvested across Illinois

Turn into Sugar:

Enzymes break down starch into a simple sugar called dextrose.

Extract the Starch:

Corn is milled to separate starch from fiber.

Fermentation:

Microbes ferment sugar into lactic acid, forming solid PLA pellets.

ALL SET!

pellets are molded into...

- 3D printing
- cups
- fillament
- grocery bags
- cutlery
- & More!





Illinois Corn: Corn Plastic

Name: _____

Class: _____

Materials:

- Water
- Corn Starch
- Corn Oil
- Ziploc Bag
- Plastic Spoon
- Food Coloring (optional)
- Microwave or hot plate
- Safety goggles
- Lab coat or apron

Objectives:

- Learn about corn-based plastics.
- Develop a real-world application for the use of your corn plastic.

Pre-lab:

Class Discussion:

1. What are some products you use that are made from plastic? _____

2. What are the advantages and disadvantages of plastic? _____

3. What is most plastic we use today made from? _____

4. Try to define plastic: _____

[**DEFINITION:** polymeric material that has the capability of being molded or shaped, usually by the application of heat and pressure]

5. How much of the plastic you use is single use? List some examples. _____

6. What are alternatives for crude oil-based plastic? _____

7. If you could create an alternative to plastic, what properties would it have? _____



STOP! Ensure you have all materials & safety equipment before moving on. Check in with your teacher.

Procedure:

1. Set up your lab station by gathering all necessary materials and safety gear
2. Next, mix the following inside of your plastic bag:
 - a. 1 tbsp. water
 - b. 1 tbsp. corn starch
 - c. A few drops of corn oil
 - d. 1 drop of food coloring
3. Seal your bag and squish the bag gently to mix everything together

Questions for part 1:

Describe the mixture in your plastic bag:

1. How does it feel when you slowly squish the bag? _____

2. Does it feel the same when you squeeze the bag quicker/harder? _____

3. Is your mixture a solid or a liquid? _____

4. Does it feel like plastic? If not, how might we turn it into plastic? _____



STOP! Clean up your workstation & get your lab checked by your teacher before moving on to step 2.

Procedure (pt. 2):

1. Microwave your mixture on high power for 10-20 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's cooling answer the questions below.

Questions for part 1:

Describe the mixture in your plastic bag:

8. What does your new substance look like? _____

9. How is it different from the mixture you started with? _____

10. If your plastic is cool, knead it with your hands. What does it feel like? Describe its other properties. _____

11. What could you make with your bioplastic? What couldn't you make? Why? _____

For Teachers:

As the plastic cools, you can carefully remove it from the plastic bag so that it will harden. It can be carefully formed into any shape, or put in a mold (ex. Ice cube tray) if one is available

Class Discussion:

- **Reflection:** Students can look for advantages and disadvantages to making plastic from biodegradable sources vs. crude oil/fossil fuels
- **Application:** Challenge students to come up with a real-world application for corn plastic
- **Research:** Search to see if you can compost the plastic, how long it takes to biodegrade, and current products being made from corn plastic.
 - o For an even further application, students could write a letter to advocate for biodegradable plastics to be used in the school, or a corporation/fast-food chain of their choice.

Resources:

[https://cdn.agclassroom.org/media/uploads/2018/03/27/Bioplastic Worksheet.pdf](https://cdn.agclassroom.org/media/uploads/2018/03/27/Bioplastic_Worksheet.pdf)

<https://www.britannica.com/science/plastic>

<https://kansascornstem.com/wp-content/uploads/2019/07/5-CornPlastics-2024.pdf>

Visual Guide:

