

## Introduction

Plastic has shaped the world in ways that we could never have imagined. The importance of plastic in the modern world cannot be understated. Plastic is inexpensive, light-weight, durable, and can be molded into virtually any shape. Plastic is present in every aspect of our lives and largely responsible for the advancements in society that we take for granted each and every day.

Still, plastic has its drawbacks. Most plastic is manufactured from nonrenewable petroleum. It is so durable that it will take generations before it biodegrades. Single use plastic products are common because they are inexpensive and convenient. Plastic trash is becoming a global concern and microplastics are even showing up in the food chain.

An alternative product that has all of the characteristics of petroleum-based plastic, but is made from a renewable, biodegradable resource is in high demand. Plastic made from corn is one possible alternative. There are currently a multitude of plastic products being produced from corn and more are being developed each day. This lab will show you how you can make corn plastic.

## Background Information

In this lab:

- Corn Starch – Will be used as the polymer chains
- Sugar or Glycerin – Plasticizer that links the polymer chains together and allows them to slide past each other
- Vinegar – helps dissolve the corn starch because it dissolves better with charged ions (can be replaced with salt)

## Materials

- Cornstarch
- Water
- Sugar or Glycerin
- Vinegar
- Rubber spatula
- Nonstick pot
- Stove
- Measuring spoons
- Plastic baggies
- Ice cube trays or decorative ice cube trays
- Apron

## Safety Considerations

Students should be very careful and have adult supervision using a stove and use hot pads when handling hot glass and other hot materials. Aprons should be used when heating the corn plastic in case of splattering.

## Questions

- What are some products that you use that are made from plastic?
- Why do we use plastic?
- What are the advantages of plastic?
- What are the disadvantages of plastic?
- What is most of the plastic we use today made from?
- How much of the plastic we use is made for a single use then discarded? List some examples.
- How is the use of plastic effecting our environment?
- What are alternatives for oil based plastics?
- Can plastic be made from other materials other than oil?
- If you could create an alternative to plastic what properties would it need to have?

## Directions

1. Mix in glass bowl
  - 8 Tbsp water
  - 1 Tbsp sugar or glycerin
  - 2 Tbsp cornstarch
  - 2 tsp of vinegar
  - Stir and heat on medium until the mixture changes to a gel and starts to become clear
  - Wait for the mixture to cool then put the corn plastic in a plastic bag for immediate examination. The corn plastic can be put into ice cube trays if you want to make a “shape with it. Let set overnight.
2. Discuss the properties of the plastic. You can change the properties of the plastic by adjusting amount of water, amount of sugar or glycerol, amount of corn starch, amount of vinegar, adding a drop of corn oil, or adding a drop of food coloring.
3. If you would like your plastic to be a different color you can add food coloring but don't add it until after the mixture becomes clear during the heating process. If you add the food coloring earlier, you will not be able to determine when the plastic turns clear and has finished heating.
4. If you are making several different batches of corn plastic, examine the plastic made from the day before. Discuss the properties of the plastic. Observe how properties differed from the original procedure. Challenge students to come up with a real word application for their corn plastic related to the unique properties of each batch created.

## Sources

- <https://science.howstuffworks.com/environmental/green-science/corn-plastic.htm>
- <https://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/videos/chemmatters-april2010-bioplastics.pdf>
- <https://www.instructables.com/id/DIY-Bio-plastics/>