

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 22

Create and Observe Properties of Biodegradable Plastic Made from Corn

Unit:
**AGRICULTURAL MECHANICS
AND TECHNOLOGY**

PRECEPTS

- E. Awareness
 - E1. Address issues important to the community

NATIONAL STANDARDS

- NS.K-4.1. Science as Inquiry



Lesson Type:
Small Group

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

1. Create and observe the properties of biodegradable plastic made from corn.





TIME

Instruction time for this lesson: **30 minutes.**



RESOURCES

None



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ tablespoon measure
- ✓ eyedropper
- ✓ box of cornstarch
- ✓ bottle of corn oil
- ✓ water
- ✓ small plastic cup
- ✓ spoon or stirring stick
- ✓ plate covered with wax paper
- ✓ access to microwave oven
- ✓ plastic cookie cutters
- ✓ can of nonstick cooking spray
- ✓ pre-popped bag of popcorn
- ✓ PALS.22.Assess.A – 1 per student

KEY TERMS



The following terms are presented in this lesson and appear in ***bold italics***:
biodegradable

INTEREST APPROACH



Let's start off today with a little snack that might just get us on the right track.

Present a pre-popped bag of popcorn. Offer a small handful as a snack to your PALS. Ask the obvious question, where does popcorn come from?



Go ahead and take a handful. So where does popcorn come from again?

Allow for response.



Exactly, and even though most people do know that popcorn is made from corn, most people don't know that we can also use corn to make a whole lot of other things—including plastic! So we're actually going to act like a couple of mad scientists and see if we can make some of our own plastic out of corn. So are you ready to be a chemist? Great! Then finish up your popcorn snack and let's open up our research lab.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Create and observe the properties of biodegradable plastic made from corn.



Read the ingredient lists from the cornstarch and corn oil packages to your little PAL.

Let's start by taking a look at some of the ingredients in these items.

Explain that these products are made from corn, the same type you just enjoyed popped.



These are some pretty hard words to say, right? Well, what's cool about them is that they are all made from corn—just like the corn we ate a few minutes ago! What's even cooler is that we can use these ingredients to make a type of plastic that goes away or breaks down over time. We call this **biodegradable** plastic. Regular plastic, which is made from the same type of oil you put in your car, takes thousands of years to break down. Let's see if we can make our own biodegradable plastic.

Have your PALS measure a tablespoon of cornstarch and dump it into the paper cup.



So, since you're the chemist today, carefully measure one tablespoon of cornstarch and add it to the plastic cup. Great!

Help your PALS use the eyedropper to add two drops of corn oil into the cornstarch.

Now, being very careful, let's add two drops of corn oil to the cornstarch using this eyedropper. Remember to be an accurate chemist and not add too much!

Have your PALS add one tablespoon of water to the cup, and then ask him or her to add two drops of his/her favorite food coloring to the mix.



Nice job! Way to be accurate! Now let's add one tablespoon of water to the mix, followed by two drops of food coloring ... you choose the color. Remember to be very careful and accurate just like with the corn oil.

Have your PALS stir the mixture until it is completely combined. Then ask a few hypothetical questions.



Excellent so far, now all we need to do is completely mix all the ingredients together.

Allow for mixing.



So now that we have this substance, do you think it looks biodegradable, or that it will break down? How does it look and act? How could we use it when it hardens?

Discuss comments and answers with students about what might happen to the substance. Next spray cookie cutters with nonstick spray. Place the cookie cutters onto flat plates covered with wax paper. Put the mixture into the cookie cutter shapes. Microwave on high for 20 to 25 seconds.



So let's see what will happen next! I'm spraying these cookie cutters with nonstick spray just to make sure our mixture doesn't stick to them. Now let's add our mixture and microwave the mix to harden it. It should take about 20 seconds.

After removing the substance, let it cool for a few moments, and then peel them out of the cookie cutters for your PALS to observe them.



Let's wait a minute for these to cool off, and then we can peel them out and take a look.

Allow for cooling, during which time you can discuss with students what the heat might have been used for.



So what happened to the plastic? Go ahead and try making it into a ball ... what happens?

Allow PALS to touch and investigate the new plastic substance and provide feedback.





REVIEW/SUMMARY/EVALUATION

Great work on this project! You know what's really cool about what we did today? Our plastic is biodegradable and less harmful to the environment than the traditional oil type plastic. Also, the corn we used for our ingredients is a renewable resource, meaning we can grow more corn to make more plastic. The plastic that comes from oil is not made from renewable sources, so once the oil is gone from underground, it is gone. Remember we also talked about what happens when we throw these plastics away—one breaks down (the biodegradable version) and one doesn't. Do you remember which was which?

Allow for response/discussion.



Exactly, you remembered! So this is good for farmers and the environment.

Use the Little Professor Moment to review content of lesson, including where traditional and biodegradable plastics come from. Also review the definition of biodegradable. And what renewable means. Student (PALS) will teach this information to a classmate so that he or she understands these key concepts. If the classmate completed a different experiment, then he or she would teach the key concepts of that experiment after the first PALS shares. If the classmate completed the same experiment, then the first PALS will share what he or she learned about the definition of biodegradable and the differences between motor oil and corn oil sources. The second PALS will share what he or she learned about how corn as a source for plastic benefits both the environment and agriculturists.

APPLICATION



Continued Discussion/Activity: *Have your PALS find as many nonfood items as he or she can that include corn products.*



One-on-One Suggestion: *Place the plastic made from the lesson and a plastic water bottle in a compost pile at school. Return to look at what happened to the products after several weeks. Which one broke down?*

PALS.22.ASSESS.A | EVALUATION - ANSWER KEY

True or False

- ____ 1. Biodegradable means the item will break down over time.
- ____ 2. Renewable means that the substance is in limited supply and will eventually run out.
- ____ 3. Traditional plastic is made from oil.

Provide a short answer to the following question:

- 4. What are the benefits of using corn to make plastic as opposed to using oil?

ANSWERS TO EVALUATION

- 1. T
- 2. F
- 3. T
- 4. Corn plastic is renewable, corn plastic is biodegradable, corn plastic helps support the agricultural industry and corn plastic is less harmful to the environment.

PALS.22. ASSESS.A

True or False

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