



SUPERABSORBENT POLYMER ICE PACKS

Grade Level

K-8

Length of Lesson

30-45 minutes

Objective

Students will learn more about superabsorbent polymers and how agricultural research can lead to innovations and products used in everyday life.

Materials (per group)

- Superabsorbent polymer powder
- 5x5" or 5x7" 6 mil reclosable bags
- Weatherproof labels
- Jugs of water
- Blue food coloring
- Pitcher
- 1 cup liquid measuring cup
- ½ tsp measuring spoon
- Several clear, 9-oz cups
- Paper towels

Standards

NGSS:

Physical Science: PS1-3;
PS2-4

Engineering Design:
ETS1-2; ETS1-3

Life Science: LS1-5; LS2-4

Lesson Summary

This lesson introduces students to superabsorbent polymers and the connection between corn, diapers, and ice packs. Students will investigate how a small amount of superabsorbent polymer absorbs water as they create their own ice pack.

This lesson adapted from a lesson by DeKalb County Ag in the Classroom

Suggested Sequence of Events:

1. Set Up: Place approximately ½ teaspoon of dry superabsorbent polymer powder into a clear plastic cup. Have a second cup or container of water prepared. Blue food coloring can be added to the water so students can easily see the liquid being absorbed.
2. Read through the IAITC corn-themed nonfiction text resources to learn more about corn byproducts. Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
 - Show students the mystery powder and ask them to make predictions about what it might be.
 - What do you think this powder is, what do you think will happen when we add water, will it sink, float, dissolve, fizz, or explode?
 - Have students observe as ¼ cup of water is added to the powder. Swirl the cup gently as if mixing the materials together.
 - Discuss Observations: Ask students, "Wow! Now what do you think this powder is?" Allow students to share their observations and revise their original predictions.
4. Make an Ice Pack: Explain that superabsorbent polymers can also be used in ice packs.
 - Add more water to the gel in the cup and have students observe how quickly the additional liquid is absorbed.
 - Transfer the gel into a labeled resealable bag.
 - Add additional water as needed.
 - Carefully press the air out and seal the bag.
5. Whole Class Discussion and Reflection: Discuss what students observed and how the material's ability to absorb water makes it useful in different products. Ask students to think about other ways this technology could be used.

TEACHER RESOURCES

Agriculture Connections

The first superabsorbent polymer was invented in 1973 by scientists at a USDA laboratory in Peoria, Illinois, using **corn starch**. **The polymer being used in the activity is not made from cornstarch, but the technology developed from scientists experimenting with cornstarch.

Everyday Connections

Ask students where a material that can absorb hundreds of times its own weight in water might be useful. Show students a diaper that has been cut in half and placed in a clear bag. Point out the white powder inside the diaper and discuss how superabsorbent polymers are used to absorb liquid in diapers.

Extension Ideas

- Have students brainstorm everyday products that could benefit from materials that absorb large amounts of liquid.
- Have students design a new product using a superabsorbent material and draw a labeled diagram of their invention.
- Have students compare the amount of water absorbed by different amounts of polymer.
- Have students research other innovations developed through USDA agricultural research.
- Have students explore the role of scientists and engineers in turning agricultural materials into useful products.
- Discuss why agricultural research is important even when the final product is not something we eat.
- Have students explore the different ways corn is used beyond food.

More Resources

- USDA-ARS Breakthrough “SUPER SLURPER” Launched Absorbents Industry (video) <https://youtu.be/rSheYFxtEKk?si=UoUNdUTVdR6QcoeT>
- One Team, One Product — Many Uses <https://agresearchmag.ars.usda.gov/1996/may/starch/>
- Super Absorbent Polymer for Manufacturing Gel Packs <https://ipcpack.com/products/super-absorbent-polymer-gel-packs/>
- Innovative Cornstarch Makes Products Sustainable and 'Green' <https://www.ars.usda.gov/news-events/news/research-news/2019/innovative-cornstarch-makes-products-sustainable-and-green/>

[Label Design File:](#)

