

## **NOW YOU SEE IT, NOW YOU DON'T**

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**Purpose:** To investigate the process by which commercial packing peanut biodegrade.

**Background:** What would happen if everything that ever died stayed unchanged where it fell? What do you think the Earth would smell like? How deep would we be in all this? Fortunately, that doesn't happen. Soon after plants and animals die, specialized organisms known as decomposers go to work on them.

Some packing materials are made of biodegradable substances. Because most are made of starch, water dissolves them. But for them to be broken down completely, the process depends on the many microorganisms commonly found in the soil. The microorganisms (bacteria and fungi) secrete a digestive enzyme that degrades the starch into its simple sugar building blocks. These simple sugars, or building blocks, can be used as energy sources by microorganisms. This is similar to what happens when a human eats starch. A digestive enzyme in saliva called "amylase" breaks down the starch into simple sugars.

Many other organisms are classified as physical decomposers. They break up the particles by chewing and grinding. This activity helps the chemical decomposers do their job. Physical decomposers include mites, millipedes, centipedes, sowbugs, snails, slugs, spider, springtails, beetles, ants and worms.

**Materials:** 6 containers, 1 measuring cup, pipettes, 7 biodegradable packing "peanuts" made of starch, 7 packing "peanuts" made of plastic, iodine, distilled water, compost additive, corn starch, potato slice, spatula, test tube, plastic spoon.

### **Procedure:**

1. Lay a potato slice out on your table on a paper towel. Put drops of iodine at 4 separate locations on the slice. **What happens** \_\_\_\_\_?
2. Put a drop of iodine on a polystyrene and a biodegradable packing peanut. **What happens** \_\_\_\_\_?
3. **Is the result similar to the reaction you got when you put the iodine on the potato?**
4. **What does this tell you about the makeup of the packing peanuts?**
5. Label your jars 1 through 6. Put 50 mL of water in each. Put 1 scoopula of corn starch in jars 1 and 2. Put 2 biodegradable peanuts in jars 3 and 4, and 2 polystyrene peanuts in jars 5 and 6. Add 1 scoopula of compost activator to jars 2, 4 and 6. Mix the contents in each jar.

6. Test the contents from each of your jars for starch. Put 5 drops of the solution from the first jar in a test tube. Add a drop of iodine to the solution. **Record your results in a chart.** Rinse your test tube thoroughly before testing the contents from the next jar.
7. Each day retest the contents from your jar for starch. **Record your results. How long does it take for you to see a change?**

**Questions:**

1. How are substances broken down chemically in nature?
2. How are substances broken down physically in nature?
3. What organisms feed off dead plant and animal matter?
4. Why is it good for things to be biodegradable?
5. What happens to substances once they are broken down in nature?
6. What factors do you think affect how quickly dead matter can be broken down?
7. How could using a garbage disposal for leftover food help the environment?
8. What happens to the polystyrene peanut when it reaches the landfill?
9. To the biodegradable packing peanut?

**Expansion:**

What would happen if you buried a starch peanut and a polystyrene peanut in the soil during the fall and then dug them up in the spring? Does temperature have an effect on the rate of starch breakdown? Does the amount of bacteria or starch affect the rate of starch breakdown? Are live bacteria necessary for breakdown action? Could you design an experiment to test a new hypothesis or question?

Design a new experiment based on data you gathered or questions you asked during this investigation. Develop a hypothesis that can be tested in a controlled experiment that gathers data. Write it up following the format we have used before.

What is the control? What variables are important? How many trials have you included?  
What will you measure? How can you show your results in a graph?