

MAKE YOUR OWN BIODEGRADABLE PLASTIC STUFF

LEVEL: 4-6

SUBJECTS:
Science, Social Studies

VOCABULARY:
Non-renewable/renewable resources, sunlight, soil, water, minerals, biodegradable, resource management, plastic, pollution, landfill

LEARNING GOAL:

Students shall develop their abilities to connect and integrate knowledge from all disciplines into their own knowledge bases.

MATERIALS

Cornstarch, paper cups, corn oil, food coloring, plastic “peanuts” and cornstarch “peanuts”.

BACKGROUND

As concern for overflowing landfills and depletion of natural resources increases, research scientists have the challenge of developing alternative products which satisfy consumer demands for safe biodegradable plastic products which have less impact on the environment. One agricultural product, corn, is being utilized to produce foam plastics which work very much like those made from scarce resources such as crude oil (petroleum). The outstanding feature of these corn-based foam plastics is that they are made of 95% cornstarch and simply disappear when exposed to water. The term “biodegradable” means that the product will break down into harmless particles and become part of the soil. This quality is especially significant as many experts speculate that landfills in the United States will be full within the next 20 years.

Another environmentally-friendly use of corn is in production of gasoline, ethanol. Ethanol is usually blended with a petroleum-based fuel. When ethanol is blended with gasoline, engine exhaust is cleaner, lessening air pollution while decreasing the demand for fossil-fuels – a non-renewable natural resource.

OBJECTIVE

The student will:

- identify the four basic natural resources.
- distinguish between renewable and non-renewable resources.
- recognize that all natural resources are needed by living plants and animals.
- list consequences for continued use of non-renewable resources.
- conduct an experiment in producing a biodegradable plastic from corn.
- develop class strategies for solving or avoiding some environmental problems.

CONCEPTUAL AREA

Decisions – responsible human decisions are necessary to maintain food and natural resources.

PROCEDURE

1. Assemble a collection of common plastic items: grocery bags, dinner plates, cups, fast-food containers, packing “peanuts” for discussion in introducing the concept of renewable and non-renewable resources. List the four basic natural resources required for all forms of life: **sunlight, air, water, soils and minerals**. Have students develop reasons why each resource is required by all living animals and plants. Point out that all of these resources are tied to food production either directly or indirectly.
2. After students have identified and determined requirements for the basic natural resources, have them select which of the four is the most non-renewable – minerals.
3. Next, help students identify some uses for minerals, examples: heating and energy fuel from coal, petroleum products such as gasoline, oil, Styrofoam products, cloth and ink. Discuss some of the liabilities for continued dependence upon specific mineral resources:
 - mineral resources can be permanently depleted by overuse;
 - dependence upon foreign suppliers for needs can become a political issue as in the Middle East;
 - utilization of mineral fuel sources for manufacturing and transportation can lead to air pollution;
 - at the current rate of use, landfills may be full within the next 20 years with materials which will not biodegrade.
4. Divide students into small groups to conduct a science experiment of producing a biodegradable plastic from an agricultural product. Use the student worksheet “Make Your Own Biodegradable Plastic Stuff.” Introduce the experiment by having students feel cornstarch. Explain that cornstarch is a corn product which has biodegradable qualities. Allow students to conduct their experiment and answer the questions as a group. Have each group present its findings to the class.

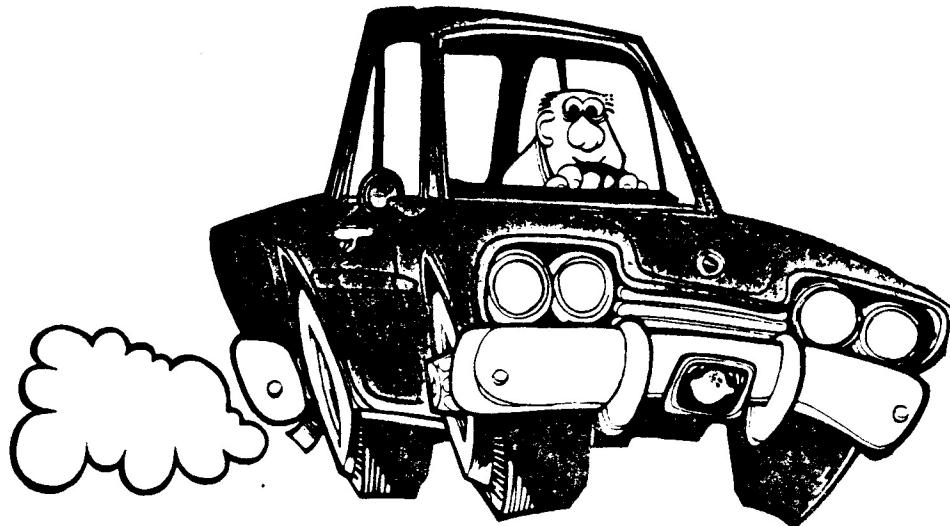
RESOURCES

“Time to Take A Fresh Look at Biodegradable Plastics,” Food Processing, November 1991 was used as a background resource material for list lesson. The science experiment was taken from Illinois Agriculture, A News Magazine for Kids, Issue 2.

EVALUATION

Evaluate students’ abilities to apply the environmental knowledge by forming problem-solving groups to develop alternatives to some of the consumer consumption issues raised in this lesson. Different groups could deal with these issues: overflowing landfills, foreign control of oil, transportation smog, factory air pollution, fast-food packaging. Solutions should reflect practice of resource conservation – the planned, deliberate use of natural resources to satisfy the basic needs of humans and other living things.

"Make Your Own Biodegradable Plastic Stuff"



DON'T BE CORNFUSED.

Place a check mark in front of each step as you finish it.

1. Place a tablespoon of cornstarch in a paper cup.
2. Add two drops of corn oil to the cornstarch.
3. Add a tablespoon of water to the oil and cornstarch.
4. Stir the mixture.
5. Add two drops of your favorite food coloring to the mixture and stir well.

1. What do you notice about your biodegradable plastic?

2. Is your biodegradable plastic the same as the other students?

3. What could you make with this biodegradable plastic if you let it harden? Remember it will dissolve eventually.

Now Try This!

Ask your parents if you could heat some of your biodegradable plastic in the microwave oven for 20 - 25 seconds on high.

12:00

What happens to your plastic? _____

Form your plastic into a ball and describe what it will do.