



# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY Lesson Plans for Teachers

[www.tceq.state.tx.us/assistance/education.html](http://www.tceq.state.tx.us/assistance/education.html)

## Biodegradability

### Grade level:

- ◆ Fourth - eighth grades.

### Sample TEKS: Science:

- ◆ 1A, B, 2A - D
- ◆ 3A - D
- ◆ 4A
- ◆ 5A, B
- ◆ 7A, B
- ◆ 10A

### Social Studies:

- ◆ 4.18A, D

### Objective:

The students will test several types of plastic bags in different environments to determine in the same environment: direct sunlight; a mulch pile (which simulates an active landfill); a leaf pile (which simulates a dry landfill); and salt water (simulates an ocean).

### Materials:

- ◆ 8 biodegradable plastic bags (use two different brands)
- ◆ 8 nonbiodegradable plastic bags (use two different brands)
- ◆ 4 brown paper bags
- ◆ 4 pages of newspaper
- ◆ 3 nets (plastic or cotton)
- ◆ wire or string
- ◆ 6 wooden posts
- ◆ mulch pile approximately 4 feet high (consisting of grass clippings and leaves with rotting vegetable matter, fertilizer, and compost starter culture in a 6-foot diameter ring made of wire fencing materials.
- ◆ leaf pile approximately three feet high
- ◆ 8 plastic containers approximately gallon each
- ◆ tap water
- ◆ saltwater (15 percent by volume)

### Procedure:

Requires a time period of at least three months. Fold and secure two types of biodegradable and nondegradable plastic bags on top of a net with wire or string. Tie a wooden post to each end of the net and place each post into the ground, leaving the plastic bags exposed to the sun. Do the

same with one paper bag and a page of newspaper.

Place two types of biodegradable and non biodegradable plastic bags, a piece of newspaper, and a brown paper bag in the middle of the mulch pile. Wet the pile thoroughly with water. Place the same types of materials that were used in previous steps in the middle of the leaf pile. Place two biodegradable plastic bags, two nonbiodegradable plastic bags, one paper bag, and one page of newspaper into four separate containers of tap water. Then, place the same types of materials into separate containers of 15 percent (by volume) saltwater. Allow all the materials to stay in their environment for three months or longer. Record the changes that occurred to the plastic bags, paper bags, and newspapers in the different environments upon removal.

After you have the different types of landfills constructed, have community members to visit and discuss the importance of recycling and the community landfill, for example, mayor, city manager, members of the community beautification committee. Take a field trip to the city landfill. Have students to determine if the landfill could be made environmentally safer.

**Evaluation:**

Did any materials decompose? If so, which materials decomposed most thoroughly? Was the degradation greatest in the exposed to the sunlight mulch pile, leaf pile, tap water, or salt water? Did the plastic bags that were advertised as biodegradable appear any different from the nonbiodegradable bags?

**Extension:**

Participate on a committee and take a census, getting public input on whether landfills are needed and how they would feel if one were going to be built near their homes.

Submitted by: Lillian Haynes, Stephen F. Austin State University TES Course, 1996.