

*Plastics Everywhere!



Learning Objectives: Students will increase their awareness of the use of plastics in their lives and learn more about which plastics are recyclable.

Subjects: Science, Social Studies, Environmental Education, Family and Consumer Education

Wisconsin Model Academic Standards: SC B.4.1, SC C.4.5, SS D.4.7, SS D.8.11, EE A.4.1, EE A.4.2, EE A.4.3, EE A.8.2, EE A.8.4, EE D.8.5, EE E.4.2, EE D.4.3, FCE introductory A.2, FCE intermediate A.3.

Grades: 4-8

* Section is adapted from waste and recycling curriculum by the California Integrated Waste Management Board.

Whether you are aware of it or not, plastics play a big part in your life. Plastic is used in everything from car parts to doll parts and from soft drink bottles to the refrigerators they are stored in. From the car you ride in to school to the television you watch when you get home, plastics are everywhere.

Plastics are made up of building blocks called **hydrocarbons**, which are derived from petroleum or natural gas, also called **fossil fuels**. They are considered **non-renewable resources** because the conditions under which they were formed no longer exist. Also, the mining, transportation and refining of petroleum creates a lot of pollution. By reusing plastics again and recycling, we can slow down the production of new plastic products from raw materials.

There are seven types of plastic, all with different scientific properties. Because of the differences in their properties, they cannot be melted together to form new plastic. It is difficult (with current technologies) to collect and properly sort the different types of plastics from one another, which makes recycling opportunities for plastics more limited than some other materials. Today, plastics with codes #1 and #2 are commonly accepted in community recycling programs. In the future, technology and innovation will hopefully lead to greater collection, recycling and the remanufacturing of plastics into other usable products.

GOING BEYOND

1. Find out which plastics are recycled in your area. Plastic containers marked with plastic number codes #1 and #2 are commonly recycled.
2. Discuss the negative aspects of using a non-renewable resource and ways to slow our consumption of these resources.
3. Assign the activity "Plastics In Your Home" as homework. Share reuse possibilities with the class.



polypropylene

polyethylene terephthalate



polyvinyl chloride

Note: About a week before you begin this lesson, ask students to bring to class a variety of plastic containers that are empty and clean (#1-#7). Cut pieces approximately 2 inches square from each plastic sample. Be sure to label one master key set for yourself with a permanent marker.

Materials:

Optional introductory activity: a plastic sandwich bag (soft film, not thick Ziploc), a pencil, water

Core activity: "Test Your Plastic Polymers" and "Plastics Codes: Determine Their Identity" handouts; cut up plastic containers #1-#7, several plastic dishes/pans or buckets for the float test

Optional Introductory Activity Procedure:

Fill a plastic sandwich bag with water. Then ask for a student volunteer who is brave enough to stand under the bag while you push a sharp pencil through it.

Hold the bag over the volunteer's head. Slowly rotate the sharp pencil in through one side of the bag and out the other side. No water should leak out. (Do not push the pencil through completely.)

Ask the students to hypothesize why the bag did not leak when the pencil was pushed through.

Explain where plastics come from and that in the production of plastics, petroleum hydrocarbons are chemically altered from a monomer (one) into polymer (many) molecular chains. As the pencil is pushed through the bag, it slips between these chains. Unbroken, the chains slide around the shape of the pencil, sealing in the water. A dull pencil, however, breaks the chains and causes the bag to leak. When the pencil is removed, the polymers may move somewhat towards their original shape, but not enough to close the large pencil hole.

Have the volunteer carefully dispose of the water.

Core Activity Procedure:

Assign students to scientific teams of three to four people. Distribute plastic pans or buckets filled with water to each team for the float test.

Provide a set of unlabeled plastic samples from as many types of plastic that you could find and the worksheet "Test Your Plastic Polymers" for each group.

Ask students to record each sample's plastic properties on the chart.

Distribute a copy of "Plastics Codes: Determine Their Identity" to each group.

Have students complete their charts by deciding which type of plastic each sample represents.

Post-Activity Reflection/Response:

1. Encourage students to share their results. Discuss the different properties of the different types of plastics (i.e., stiff, light, flexible).
2. Why are there many different kinds of plastics in use? *Different resins are suited to different uses, depending on their strength, flexibility, and resistance to specific chemicals or heat (some bottles are filled with hot liquids).*
3. Why do some plastics have to be separated before they can be recycled? *Each plastic has a different set of properties and is used for specific purposes. Various plastics have different melting points, so if they are mixed together, the process becomes contaminated and no longer results in a reusable new plastic.*
4. Explain to students that the recycling process for plastic containers includes: (1) sorting the containers by their resin types; (2) cutting the plastic into tiny pieces, called pellets; (3) melting the pellets; and (4) reshaping into new plastic objects. Students should be advised to never melt plastic themselves because the fumes are very dangerous to your health and to the air quality.

PLASTICS EVERYWHERE! PLASTIC CODES: DETERMINE THEIR IDENTITY

Student Handout



Code	Type	Name	Description	Some examples
PETE		polyethylene terephthalate	usually clear or green, sinks in water, rigid, glossy	soda bottles, peanut butter jars, vegetable oil bottles 
HDPE		high density polyethylene	semi-rigid, usually sinks in water, cloudy colored plastics	milk and water jugs, bleach bottles 
PVC		polyvinyl chloride	semi-rigid, glossy, usually sinks in water	detergent/cleanser bottles, pipes 
LDPE		low density polyethylene	very flexible, not crinkly, usually floats in water	6-pack rings, bread bags, sandwich bags 
PP		polypropylene	semi-rigid, low gloss, usually sinks in water	margarine tubs, straws, yogurt containers, reusable food storage containers 
PS		polystyrene	dull appearance, floats in water	styrofoam, packing peanuts, egg-cartons, foam cups 
Others		multi-layer plastics	often brittle, glossy and clear, usually sinks in water	reusable water bottles, baby bottles 



PLASTICS EVERYWHERE!

PLASTICS IN YOUR HOME

Take Home Worksheet, pg. 1

You'll be using this worksheet to poll family members about their plastics recycling knowledge and also for an inventory of what type of plastics your household uses. Wisconsin state law requires that all plastic types #1–#7 are recycled, but currently #3–#7 are exempt because there aren't any good cost-effective options available for them to be reused.

Use the "Plastic Codes: Determine Their Identity" handout as a guide as you check your home for different types of plastics. Be sure to check your pantry, refrigerator, laundry room, bathroom and under your kitchen sink. Write your findings in the table on the next page. Attach an extra sheet if necessary. After you have completed your investigation of plastics at home, answer the questions below.



1. What was the most common type of plastic you found in your home?

2. Does your household recycle this plastic type or is it discarded in the trash?

3. Ask your family which plastics they recycle and which are discarded, and write down their responses.

4. What is the percentage of #1 and #2 plastics you found compared to the other plastics? (example: 11 out of 20 would be, 11 divided by 20, which is .55 or 55 percent)

5. What are some ways you can increase that percentage in your home?



