

Buried Treasure Lesson 2B: Sorting it Out—Plastics

Lesson Overview:

In this lesson, students explore how physical properties are used to sort recyclable materials efficiently. After describing the look and feel of plastic samples, students complete an investigation to determine their relative densities. Next, students discover the type of plastic container the sample was taken from and search for the recycle symbol and number located on each container. Finally, students predict which type of plastic is recycled most at their school and investigate to determine the accuracy of their predictions.

Objectives:

Students will describe physical properties of objects.

Students will sort plastic samples using relative density.

Students will describe ways that recyclable materials can be sorted.

Essential Questions:

What are some efficient ways to sort recyclable objects?

Materials:

- Rectangular shaped plastic samples (all the same size: approximately 1 inch by 2 inch)
 - 1 set of samples A, B, C, and D for each group
 - Sample A-milk jug (or high-density Polyethylene-Recycle #2)
 - Sample B- water bottle (or Polyethylene Terephthalate-Recycle #1)
 - Sample C-clear sandwich bag (or low-density Polyethylene-Recycle #4)
 - Sample D-sour cream container (or Polypropylene-Recycle #5)
- Clear plastic cups (3 per group of students)
- Solutions (1 set of high density, medium density, and low density solutions per group)
 - High density- 50g Epsom salt dissolved in 150mL of pure water (or 25g of Epsom salt per 75mL of water)
 - Medium density-150mL pure water
 - Low density-75mL isopropyl alcohol mixed with 75mL pure water (1:1 ratio alcohol and water)
- Tweezers or tongs (1 per group)
- Goggles (to avoid alcohol contact with eyes)
- Paper towels
- Student Pages:
 - Plastics—Sink or Float?
 - Plastics—Cracking the Recycling Code
- Plastics Assessment and Answer Key
- Thinkgreen.com website:
 - <http://www.thinkgreen.com/recycling>
 - <http://www.thinkgreen.com/recycle-what-detail?sec=plastics>

Time Frame: 2-3 sessions

Instructional Activities (may include formative assessment within the lesson):

1. Review vocabulary students used in Lesson 1A to describe physical properties. List words on the board (e.g. transparent/clear, opaque, flexible, etc.).
2. Provide students with plastic samples A, B, C, and D (see materials list). Be sure NOT to tell students the containers from which the samples were taken. Ask students to use their senses of touch and sight to describe the samples.
3. Tell students that today they will explore some additional ways recyclable objects can be sorted. Discuss how density is an additional way the samples might be described. Show students three different solutions labeled High, Medium, and Low Density. Tell students if an object has a higher density than the solution in which it is placed, the object will sink. If the object has a lower density than the solution in which it is placed, the object will float. Show students an example and provide clarification if needed. Discuss how the experiment is a fair test because the samples are the same size and shape.
4. Have students complete Student Page: Plastics-Sink or Float? (see sample response below)

	High Density	Medium Density	Low Density
Sample A (milk)	Submerged just beneath the surface	Floats	Sinks
Sample B (water bottle)	Sinks	Sinks	Sinks
Sample C (sandwich bag)	Floats	Floats	Sinks (suspended in middle)
Sample D (sour cream)	Floats	Floats	Floats

5. Ask students to look at their data and rank the samples from highest density to lowest density. Remind students that a sample that sinks in all of the solutions would have the highest density while the opposite would be true for the sample with the lowest density. Students may

discuss their findings in a group before the groups share their thinking with the whole class.
(highest to lowest density: Samples B, A, C, D)

6. Reveal the containers from which the plastic samples were taken (A=milk jug, B=water bottle, C=sandwich bag, D=sour cream container). Ask students to locate the recycle symbol with the number inside on each container.

7. Discuss how plastics must be sorted by density in order to be useful to manufacturers. Allow students to explore the sections "Make Sure It's Clean", "The Plastic Recycling Code" and "Learn More about Recycling Plastics" at <http://www.thinkgreen.com/recycle-what-detail?sec=plastics>. Students should record notes on the Student Page: Plastics—Cracking the Recycling Code.

8. As an extension, students can predict which type of plastic is recycled most at school over a period of a few days. As a class, investigate to confirm or reject student predictions by examining the type of containers located in the school recycling bin. Discuss ways to REDUCE the amount of plastic that is used. (e.g. REUSING plastic water bottles.)

Lesson Assessment:

Students complete Plastics Assessment.

Reflection:

Ask students why the recycle numbers on plastic materials are helpful.

Standards Correlation:

This lesson may be used to address the National Science Education Standards listed below.

NSES 4BPS1.1: Observable properties

NSES 4BPS1.2: Materials and their properties

NSES 4FSPSP3.3: The supply of many resources is limited