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Florida Sea Grant
http://sfyl.ifas.ufl.edu/flagler/marine-and-coastal/

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Does it Sink or Float?

An activity involving the densities of different plastic resins.

Targeted age: Recommended for upper elementary students and older. I have used this activity at elementary STEM fairs where parents were present to help the younger students. It could potentially be modified to incorporate more math (e.g measuring/calculating volume of plastic pieces and calculating the densities).

Summary: Students will weigh small pieces of different types of plastic, then submerge each into water and record whether the plastic sinks or floats. They will then identify a type of product that is made from each of their plastic types.

You will need:

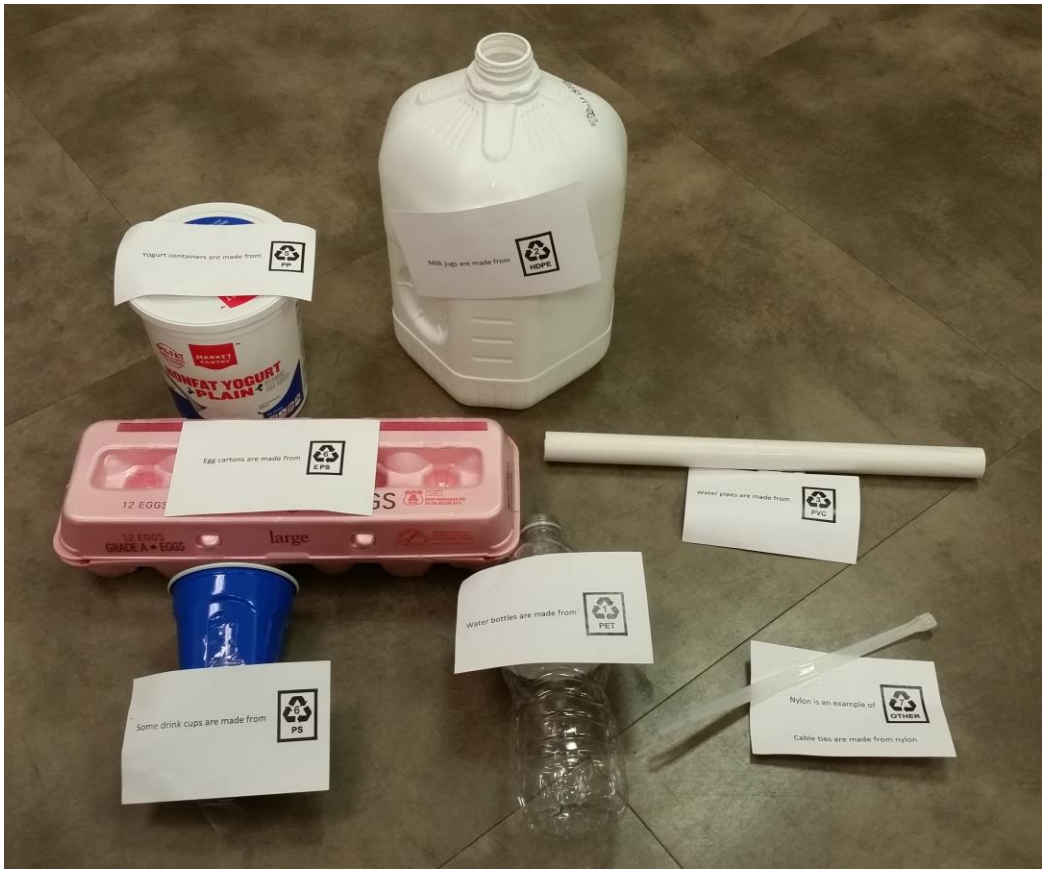
- Items made from different plastic resins (at least 2 of each) e.g.
  - Plastic water bottle (PET, recycling code 1)
  - Milk jug (HDPE, recycling code 2)
  - ½" PVC pipe or cotton swab packaging (PVC, recycling code 3)
  - Lids from oatmeal containers (LDPE, recycling code 4)
  - Yogurt tub (PP, recycling code 5)
  - Solo cup (PS, recycling code 6)
  - Egg carton (EPS, recycling code 6)
  - Nylon cable ties (recycling code 7)
- Small containers to put/store plastic pieces in
- Very fine permanent markers (different colors are helpful)
- Small containers of water (clear cups or bowls are good)
- Paper towels or small towels
- Small electronic balances (that will record 0.01 gram—these can be purchased for less than $15)

Students will need:

- Tweezers
- Clipboards
- Data sheets
- Pencils
- Small containers (e.g. fruit cups)

Getting ready:

1. Use scissors or a sharp craft knife to cut one of each type of plastic item into small squares (approx.. ¼" x ¼"). Exceptions: cut the cable ties into pieces that are approximately ¼" in length. If using PVC pipe, use a chop saw to cut it into approximately 1/8" rings.
2. Wherever possible, write the recycling number on each small square. I used different colors for the different numbers—that way if the number becomes hard to read, the color still identifies the item. Otherwise it can be difficult to tell one clear or white square from another.
3. Put the pieces of each type of plastic in separate small containers. Label the containers with the plastic type and recycling code. (PET=polyethylene terephthalate; LDPE=low density polyethylene; PVC=polyvinyl chloride; PP=polypropylene; PS=polystyrene; EPS=expanded polystyrene—this may simply be labeled PS on the product; Nylon is grouped with "other" plastics.)
4. You may want to print small signs to attach to each of the intact plastic items that tell the plastic type and recycling code, or you may want to have the students find these on the items themselves. Cable ties will probably not have the recycle number on them. You may want to explicitly label the egg carton as EPS rather than PS (EPS floats, PS sinks).
5. Printable Instruction pages, data sheets and identification signs are included in this document.



For the activity itself:

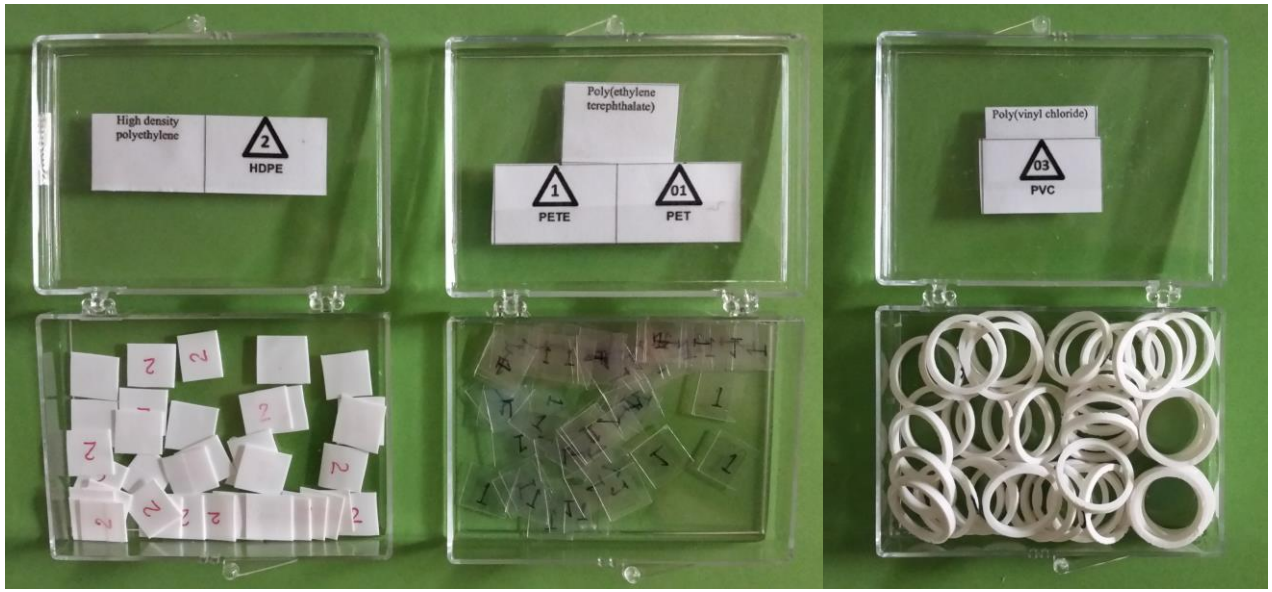
1. Allow students to select 2 or 3 different types of plastic items from the small containers. (I gave them washed fruit cups to put their items into). For each, have them record the plastic type and recycle number on their data sheet.
2. Show them how to tare and use the electronic balances. Have them weigh each of their plastic pieces and record the weights on their data sheets.
3. Have students take each plastic piece, one at a time, and use the tweezers to submerge the plastic in water, then let go of the plastic and record if it sinks or floats.
4. Ask students to put their plastic pieces on paper towel or small towels to dry.
5. Have students find the objects that match the type of plastic that they tested, and determine whether each object would sink or float in water.

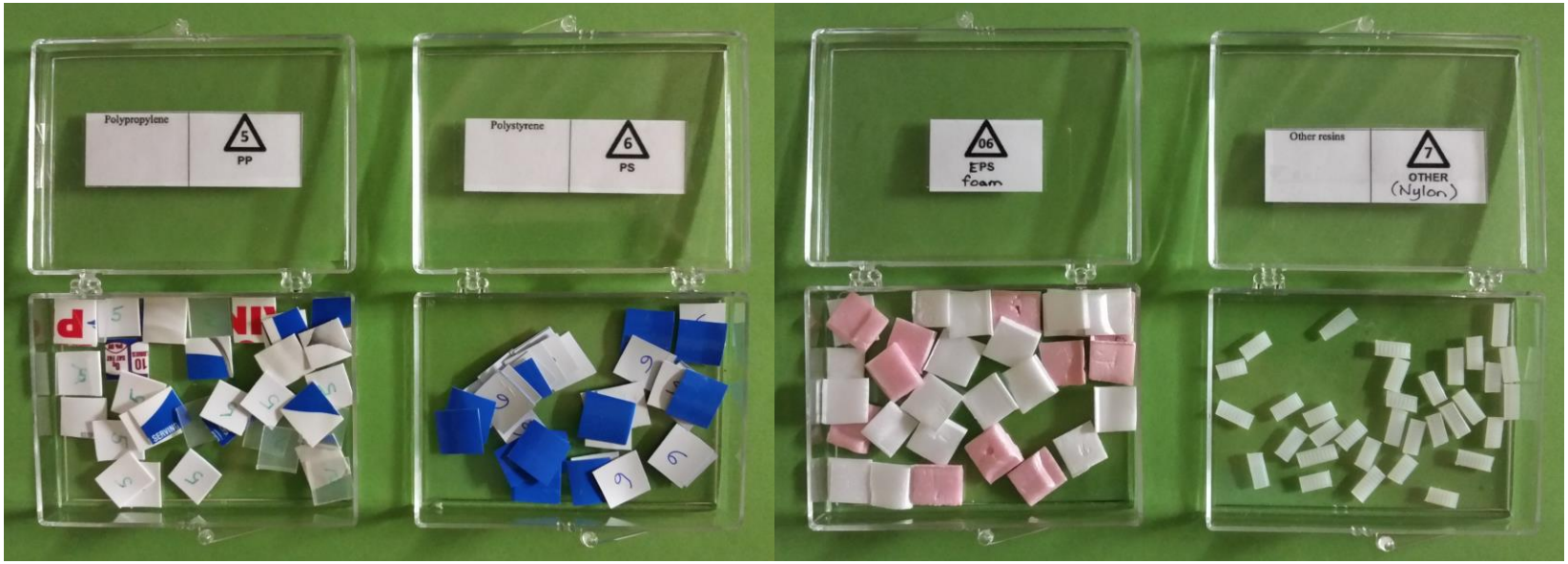
What should they find? These plastic types float: LDPE, PP, and EPS
These plastic types sink: PET, PVC, PS and Nylon.

The graphic at http://www.grida.no/resources/6930 might be interesting to use along with this activity. You could also ask students to look for/identify other common items that are made from different plastic resins (e.g. plastic bottle caps are usually made from PP).

Activity by Maia McGuire, PhD, UF/IFAS Extension Agent IV.

Different plastic types used in “Sink or Float?” Activity





Sink or Float? Data sheet

	Sample A	Sample B
My plastic has this number:		
The letters/words used to describe this plastic are:		
My plastic weighs (grams):		
Does your plastic sink or float in water?		

Find the objects that are made with each type of plastic that you tested. Complete the two sentences below (one for each of your plastic types).

Example: *Grocery bags* are made from *LDPE* plastic. They should *float*.

1. _____ are made from _____ plastic. They should _____.

2. _____ are made from _____ plastic. They should _____.

Sink or Float? Data sheet

	Sample A	Sample B	Sample C
My plastic has this number:			
The letters/words used to describe this plastic are:			
My plastic weighs (grams):			
Does your plastic sink or float in water?			

Find the objects that are made with each type of plastic that you tested. Complete the two sentences below (one for each of your plastic types).

Example: *Grocery bags* are made from *LDPE* plastic. They should *float*.

1. _____ are made from _____ plastic. They should _____.
2. _____ are made from _____ plastic. They should _____.
3. _____ are made from _____ plastic. They should _____.

Does it sink or float?

START HERE!

Instructions:

1. Get a data sheet/ clipboard, a pencil, a small cup and a pair of tweezers.

2. Choose TWO different types of plastic to test. Use the tweezers to place one piece of each in your small cup.
3. Look at the lids of the boxes you took your plastic from. Write the number and the letters/name that goes with each type of plastic on your data sheet.

4. One at a time, weigh each piece of plastic on the digital scale. Record the weights on your data sheet.

5. Use your tweezers to place one piece of plastic at a time into the water. Make sure to push the plastic piece down into the water. Let go with the tweezers and observe what happens.
6. Record on your data sheet if each plastic piece floats or sinks.

7. Use the tweezers to take each piece of plastic out of the water and place it on the paper towel.

8. Identify the items that are made from the types of plastic that you tested. Complete the last item on your data sheet.

Using the digital scale

1. If there are no numbers showing on the scale, press the On/Off button to turn the scale on.
2. If the numbers do not read 0.00, press the Tare button once.
3. Carefully place the item to be weighed on the silver part of the scale. Wait for the number to stop changing.
4. Carefully remove the item from the scale.
5. When you are finished, if nobody is waiting to use the scale, please press the On/Off button to turn it off.

PLEASE DO NOT PRESS ON THE SCALE!