



## What's in a Bottle?



Michelangelo reportedly said that when he made a great sculpture, he was merely freeing the figure he saw trapped within a huge block of marble. What do your students see trapped in an empty plastic bottle? The most creative use of an empty plastic bottle wins.

### Exercise:

As a homework assignment, have students research the chemical make up of a plastic bottle. What are the health risks of these chemicals? What happens when these substances are ingested by animals? Have students prepare a 2-page write up of their findings, double spaced.

### Suggestion:

Assignment is worth points – and points will be taken off for poor grammar and spelling.

### Supplies:

- Empty bottles (6-oz)
- Sturdy scissors
- Paints
- Brushes
- Glue
- Glitter
- Tissue paper
- Buttons
- Beads
- Pipe cleaners
- Stick on google eyes
- Stickers
- Confetti





While we are thinking about the negative impacts of plastics in our environment, it helps to connect with nature more directly. Few things can make this more personal than caring for something green.

**Exercise:** Create an herb garden out of an empty six-pack of plastic bottles. Start with six bottles per student. Have students cut off the tops, punch a few holes in the bottom and fill each container with soil. Insert several seeds of different plant varieties into each container. Place containers in a larger drainage saucer.

Make sure students tend to the plants every few days to keep them watered. Once sprouts shoot up, have students put the plants in a sunny place to grow.

### Supplies:

- Empty bottles (12-oz)
- Sturdy scissors
- Soil
- Watering can
- Herb packets (basil, cilantro, parsley, rosemary, sage, thyme, etc.)



## Making an Herb Garden



ELKAY



## From Bottles to Birdfeeders

Plastic bottles can be devastating to the animal world, including birds. As they slowly break down, plastic particles are often mistaken for food. Once in the animal's digestive tract, they can become an obstruction: sharp edges can puncture delicate tissue; they take up room needed for real food; they can cause dehydration because there is not enough space left for needed fluids; and they can leach toxins that impact the animal's endocrine system or poison the animal. With this project, we can make sure that a few plastic bottles actually do something good for our feathered friends by making birdfeeders out of our discarded bottles.

### Supplies:

- Empty bottles (20-oz)
- Drill with small & large size bits
- Thick twine
- Bird seed
- Wooden spoons (2 per bottle)
- Glue to secure spoons once inserted through bottle

### Exercise:

1. Drill a hole in the cap and insert two loose ends of a piece of twine through the hole.
2. Make a big knot on the inside that cannot slip back through the opening.
3. Have students drill two sets of holes in the bottle; each pair of holes are to be drilled directly across from each other, on opposite sides of the bottle.
4. Run 2 wooden spoons through the bottle - in one side and out the other.
5. Glue in place.
6. Drill holes above each spoon's shaft large enough to allow a small beak to have access to bottle contents.
7. Fill bottle with seeds. Replace cap and hang where birds can access feeder.

ELKAY

ez  
Wish  
KIT

## Watering Helps to Recycle

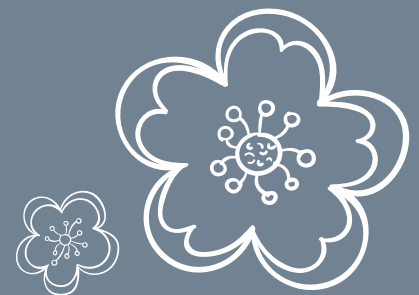
As we explore how plastics impact rivers and streams, this exercise shows us how recycling a bottle into something useful can help protect our waterways from being polluted.

### Exercise:

1. Using a clean plastic bottle, draw the drill spots for a 5 x 5 'grid' of holes. Grid will be 1¼" x 1¼" if holes are spaced ¼" apart.
2. Once grid is drawn on bottle, heat the tip of a nail over lit candle until it is hot enough to melt through the plastic.
3. Melt a hole where each marker spot is marked. This will become the "sprinkle head" of the watering can.
4. On the opposite side of the bottle, cut a hole that is ¾" x ¾". This will be used to fill the watering can.
5. Decorate watering can, and use it to care for the herbs made from the "Making an Herb Garden" activity.

### Supplies:

- Clean bottles with caps
- Marker
- Finishing nail
- Gloves or pliers to hold nail while heating
- Candle
- Matches
- Sturdy scissors or utility knife
- Paints and brushes



A close-up photograph shows a child's hands, wearing a pink sweater, constructing a molecular model. The model is built on a dark wooden surface using colorful gumdrops (green, yellow, white, orange, purple) as atoms and wooden toothpicks as bonds. The child is currently placing a green gumdrop onto a structure. In the background, a small white bowl contains more gumdrops.

## Some Kind of Chemistry

### Exercise:

Break your group into seven teams. Using Gum Drop type candies and toothpicks, have each team research and then construct the chemical structure of the different plastics in the seven recycling codes:

• **PET**

• **PE-HD**

• **PVC**

• **PE-LD**

• **PP**

• **PS**

• **O**

### Supplies:

- Toothpicks
- Multi-packs of Gum Drops





# Simulation Game

## Exercise:

Have your group break into five teams. Each team will “simulate” a different step in the “Five Steps of Recycling,” finding a way to demonstrate what is done in each step. Break lesson into two parts.

**PART I** Part one takes place at the end of the first day. Have students research their step in the recycling process, and determine how they will act out or simulate it. Team can decide if there are supplies they can bring from home to make the simulation more realistic/interesting. Teams may need to collaborate with the next step in the process, or the step before them, to make sure the process is seamless.



**PART II** During part two, the next day, students will act out the process, one group right after the next.



ELKAY



### Exercise:

Have students collect their family's empty plastic bottles for one week. Because we are really all just part of one big family, have the students bring their family's bottles in to school and combine them. Sort bottles to create a display depicting how many wind up in landfills and elsewhere (such as a river) vs. being recycled.

If only one in five bottles are recycled, calculate how many bottles your combined families send to a landfill vs. recycling each year. Assuming each class has similar family behaviors, how many bottles does your school send to a landfill vs. recycling each year?

## Family Habits



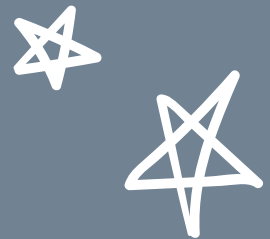


Plastic bottles in the woods and waterways mess up the homes of critters and fish. How would you like it if you had to sleep with empty plastic bottles in your bed?

### Exercise:

Tonight, have students try sleeping with 5 or 6 empty plastic water bottles in their beds. Have them ask their parents to take a picture as they struggle to lay down comfortably. Come to class prepared to discuss the experience the next day.

## Going to Bed with a Bottle



Z

Z

Z





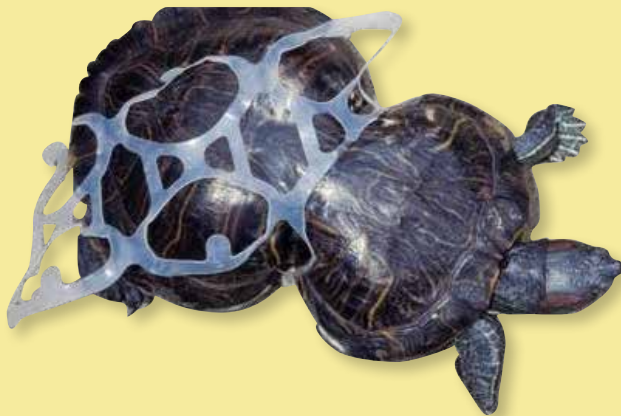


## 6 PACK Ring Around "Rosie"

Plastic bottles often come in plastic rings that hold them together in a six-pack. When these six-pack rings are discarded, they often get loose in the environment. Animals like Rosie get caught in them, and can either be hurt or die as a result, or can live with them and suffer long term harm or deformity.

### Exercise:

Have your students plan and execute a campaign in their community to get everyone to cut open their six-pack rings to prevent wildlife from becoming entangled.



*Rosie was a baby turtle in the 80s when she became stuck in the plastic ring of a six-pack holder that someone failed to dispose of properly.*



*Rosie was rescued and cut free of the plastic in 1993. Because of her deformity, she cannot live in the wild and now lives in captivity.*



## What are the 'Five Gyres' and how can we make a difference?

Have students research plastic gyres. What causes them? Why are they bad? Is there anything good about them? Should we do something about them? What can we do – as average citizens, and as a global community – to prevent them? What can we do to remove what is already out there?

**Exercise:** Have students prepare a 5-page write up of their findings and recommendations, double spaced.

**Suggestion:** Assignment is worth points – and points will be taken off for poor grammar and spelling.



## Healthy Hydration

As humans, every beverage we drink adds to our hydration. But you might be surprised to learn that WHICH drinks you choose — and how much of them you drink — can seriously affect your health. When you are considering beverage choices, you should keep in mind the calorie content and what it means for your body. For example, drinking water instead of three sugary drinks a week for a year could save 6,084 grams of sugar, which amounts to 24,336 calories. If 3,500 calories adds up to a pound of body weight, that's 6.95 extra pounds over the course of a year, just from drinking sugary drinks. Is it worth it?

### Exercise:

Have students research the hydration choices of the average American.

- What beverage choices are they making today?
- What percentage of his or her calories typically come from sugary beverages?
- What would be better beverage choices for them to make?

Have them write up their findings on one page, double spaced. Grammar and punctuation matter!





F	Q	M	W	D	I	N	R	E	C	Y	C	L	E	E
B	N	U	R	E	T	T	I	L	D	A	E	L	H	N
M	B	I	O	D	E	G	R	A	D	A	B	L	E	V
E	V	D	C	X	M	E	O	Q	T	D	T	S	A	I
T	T	I	J	O	U	U	U	C	E	S	O	W	L	R
S	S	R	L	S	N	E	E	R	E	U	U	H	T	O
Y	O	O	E	A	N	S	E	L	R	A	Y	S	H	N
S	P	P	C	C	N	T	E	C	O	D	N	K	Y	M
O	M	S	H	C	L	D	E	R	R	R	A	S	B	E
C	O	O	M	I	A	W	F	A	V	E	T	T	S	N
E	C	T	F	J	A	A	T	I	Y	A	D	E	P	T
Z	N	P	O	T	Z	E	B	T	L	U	T	U	P	J
H	W	Y	E	F	C	I	T	S	A	L	P	I	C	L
Z	W	R	L	E	U	F	L	I	S	S	O	F	O	E
O	G	C	T	A	P	W	A	T	E	R	K	S	L	N

Locate the words listed below in the grid. Words may run forward or backward; horizontally, vertically, or diagonally.

## Environmental Word Search

- Oceans** Earth is 71% water; our oceans hold 96.5% of Earth's water.
- Quench** Water quenches our thirst better than any other liquid, which is why we need to drink up to 8 glasses of water a day.
- Healthy** Our bodies are 60% water and for some organisms, it is 90%.
- Environment** Although plastic bottles are recyclable, many end up in landfills and take up to 1,000 years to break down. Or they can end up in the sea, killing marine life that mistake them for food.
- Hydrate** Staying hydrated helps our bodies to run and think better.
- ezH2O** Bottle filling station that is a quick and clean way to stay hydrated at school.
- Filtered** Many ezH2O bottle filling stations have filters designed to remove lead particles and chlorine among other contaminants.
- Petroleum** 17 million barrels of oil are used to make plastic water bottles every year. That is enough to fuel 1 million cars.
- Fossil fuel** Fossil fuels used to make plastic bottles are typically millions of years old.
- Plastic** In 2015, the average American used 167 disposable water bottles, but recycled only 63.
- Conservation** Plastic in the ocean breaks down into such small segments that pieces of plastic from a one liter bottle could end up on every mile of beach throughout the world.
- Cryptosporidium** Cryptosporidium is one of the leading causes of waterborne disease caused by contaminated drinking water.
- Lead** The EPA's acceptable standard amount of lead in drinking water is zero.
- Ecosystem** One of the most ubiquitous and long-lasting changes to the surface of our planet is the accumulation and fragmentation of plastic.
- Source water** Drinking water comes from ground water (aquifers), streams, rivers, and lakes. Protecting these drinking water sources is key to sustaining safe drinking water supplies.
- Tap water** The United States is fortunate to have one of the safest public drinking water supplies in the world. There are approximately 155,000 public water systems in the United States.
- Litter** Plastic makes up 90% of all trash in oceans. Plastic pieces now outnumber sea life 6 to 1.
- Landfill** 62% of plastic bottles are going into landfills. A portion of these end up in our oceans, rivers, lakes, streams.
- Sustain** Plastic is manufactured from a non-renewable resource, contains harmful chemicals, and is expensive to recycle.
- Biodegradable** Plastic is not biodegradable.
- Compost** Organic matter that has been decomposed and recycled as a fertilizer. Many drinking cups can now be made of compostable material.
- Recycle** According to the EPA, the national recycling rate is just 30%. Increasing recycling to 60% could save the equivalent of 315 million barrels of oil per year. The amount of plastic manufactured in the first ten years of this century will approach the total produced in the entire last century.
- Reduce** You can reduce your carbon footprint by drinking from bottle filling stations whenever you are away from home.
- Reuse** 33% of plastic is used once and then thrown away.



# Environmental Word Search

F	Q	M	W	D	I	N	R	E	C	Y	C	L	E	E
B	N	U	R	E	T	T	I	L	D	A	E	L	H	N
M	B	I	O	D	E	G	R	A	D	A	B	L	E	V
E	V	D	C	X	M	E	O	Q	T	D	T	S	A	I
T	T	I	J	O	U	U	U	C	E	S	O	W	L	R
S	S	R	L	S	N	E	E	R	E	U	U	H	T	O
Y	O	O	E	A	N	S	E	L	R	A	Y	S	H	N
S	P	P	C	C	N	T	E	C	O	D	N	K	Y	M
O	M	S	H	C	L	D	E	R	R	R	A	S	B	E
C	O	O	M	I	A	W	F	A	V	E	T	T	S	N
E	C	T	F	J	A	A	T	I	Y	A	D	E	P	T
Z	N	P	O	T	Z	E	B	T	L	U	T	U	P	J
H	W	Y	E	F	C	I	T	S	A	L	P	I	C	L
Z	W	R	L	E	U	F	L	I	S	S	O	F	O	E
O	G	C	T	A	P	W	A	T	E	R	K	S	L	N

## Answer Key



# Plastic Scavenger Hunt

Head out to your local park for this adventure and clean up your community in the process. Bring a bag with you, preferably an eco-friendly alternative to a plastic trash bag, and gather each of these items:



- Plastic bottle
- Plastic bottle cap
- Plastic ring from a 6-pack of soda (be sure to cut it up!)
- Plastic shopping bag
- Plastic straw
- Plastic to-go cup lid
- Plastic toy
- Plastic car part
- Discarded Blu-ray/CD case
- Plastic beauty products (lip balm container, plastic comb, a lost barrette, etc)
- Plastic that is the color red
- Plastic that looks really old
- Plastic half-buried in the dirt

End the activity with a series of stats and facts that highlight the educational reason behind the importance of keeping plastic out of our environment. (Use facts from the Environmental Word Search Activity Sheet.)

Encourage classes to use all the plastic litter they gathered to do the Recycling Plastic activity.





## Recycling Plastic

Building on the Plastic Scavenger Hunt activity, this activity illustrates the differences between the SPI resin identification codes (1-7) that appear on plastic containers and packaging. This activity can also be executed without the Plastic Scavenger Hunt by asking students to bring in discarded plastic from their homes.

Before you start the activity, contact your maintenance manager, city, or local recycling collector to determine the types of plastic that are collected for recycling in your community.

### Activity

- Sort the plastic litter your class collected from the Plastic Scavenger Hunt into separate bins, one bin for each plastic identification code (1-7).
  - ▷ For all plastic that doesn't have a plastic identification code on it, place it in an 8th 'unidentifiable' bin.
- As you sort, fill out the accompanying Recycling Plastic Worksheet:
  - ▷ Count the total number of plastic pieces that went into each plastic identification code bin.
  - ▷ Calculate the percentage of total plastic litter you collected that went into each bin.
  - ▷ List the types of items you collected made of each plastic code.
- Add up the total number of plastic items that your class collected (sum of plastic in all bins).
- What total percentage of your plastic litter is recyclable?

### Discussion guide

- Why do we need a plastic identification code?
- Which plastic identification code has the most plastic litter that you picked up?
- What percentage of all the plastic litter that you picked up did not have a code on it? Discuss why there was no code? Should there be a code? What effect does that have on whether people recycle?
- For what percentage of your plastic litter are you unsure about whether it is recyclable? Is that a problem? Where can you look for the answer?
- Which code bins have the widest variety of items? Discuss how each individual code can produce a variety of items.
- What is the role of plastic in our society?
- Why do you think there is plastic littering our parks and streets?
- What can you do to limit the amount of litter?

### Additional information

- Plastic is not any one material. Rather, it is a family of related materials with varying properties. To recycle it most efficiently, it needs to be separated by the type of resin from which it's made (i.e., 1-7).
- Most curbside recycling programs accept #1 and #2 plastic. Grocery bags made from #4 plastic can often be brought back to grocery stores for recycling. While other plastic may be recyclable, it's best to check with your local recycling program to determine how collection is handled in your community.
- Plastic creates a litter problem because it is very lightweight and can be swept by wind and water across land, into storm drains, and into waterways and ultimately into the ocean.



ELKAY®



## Recycling Plastic Worksheet

How many total pieces of plastic were collected? \_\_\_\_\_



**Abbreviation:** PETE or PET  
**Polymer Name:** Polyethylene terephthalate

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Soft drink and water bottles, peanut butter jars, tote bags, carpet



**Abbreviation:** PP  
**Polymer Name:** Polypropylene

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Yogurt containers, margarine tubs, disposable cups and plates, disposable microwaveable food containers



**Abbreviation:** HDPE or PE-HD  
**Polymer Name:** High-density polyethylene

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Milk, juice and water bottles, trash bags



**Abbreviation:** PS  
**Polymer Name:** Polystyrene

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Egg cartons, packing peanuts, Styrofoam cups and plates, disposable clamshell food containers



**Abbreviation:** PVC or V  
**Polymer Name:** Polyvinyl chloride

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Juice bottles, PVC pipes, cling films, lawn chairs, non-food bottles, children's toys



**Other plastic:** such as acrylic, nylon, polycarbonate, and ABS

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Baby bottles, beverage bottles, electronic casing, car headlights, safety glasses



**Abbreviation:** LDPE or PE-LD  
**Polymer Name:** Low-density polyethylene

1. How many pieces of plastic have this code? \_\_\_\_\_
2. What percentage of the total pieces have this code? \_\_\_\_\_
3. What types of items have this code?

**Typical Uses:** Plastic grocery bags, frozen food bags, 6-pack rings, squeezable bottles, flexible container lids





# Water Quality Test

## Test the purity of the water in your school

To do this assignment, you'll first need to purchase a water test kit. Various test kit brands available under \$20. Shop online or at your local hardware store.

As you prepare a water sample, have a discussion on the importance of access to safe drinking water (a bevy of information on water to help guide this discussion can be found on the EPA's website [www.epa.gov/learn-issues/learn-about-water](http://www.epa.gov/learn-issues/learn-about-water)):

1. Where does our drinking water come from? Do you think friends and family know the source of their drinking water? Would it make a difference if they knew?
2. How do lead and other contaminants get into our water supply?  
(See <https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants>.)
3. Why is water considered our most precious resource? Do you agree? Do you feel we act accordingly? Why or why not?
4. How many ways do we rely on water in our community? Consider municipal, agricultural, industrial uses.
5. What are the threats to water in our community?
6. Is water wasted in our community? In what ways?
7. How are water decisions made in our community?
8. How would you feel if you had to buy water from another part of the country?
9. Does the government control water usage?
10. What happens to wildlife in our community and our local habitats during water shortages or if the water becomes polluted?
11. How can we conserve water in our community and in our homes? How can you as an individual conserve water?



## Reviewing the results

1. Review your water quality as a class.
2. Compare your results to the primary standards set by the EPA.  
(See [www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants](http://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants).)
3. If your test results do not meet the primary standards set by the EPA, then discuss as a class what actions you can take. One simple action is to install a filtered ezH2O® bottle filling station in your school hallways.
4. To request additional analytical tests, work with your school's maintenance or facilities manager to contact the EPA ([www.epa.gov/waterlabnetwork](http://www.epa.gov/waterlabnetwork)).



## Water Taste Test

Fill pitchers with different types of water: filtered tap water, non-filtered tap water, pre-packaged bottled water, etc. Line up the pitchers and assign letters to each sample so that students don't know which they are testing. Each student gets a glass to sample from each pitcher and a rating sheet (attached).

### Discussion guide

- Before tasting water samples, how do you expect the results to turn out?
- Tally the results... which water received the highest ratings on each of the qualities?
- Overall, which water had the highest total score, and is the class's favorite water type?
  - Did you predict the results accurately?
  - Which quality were you most surprised by?
  - Bottled water makes a large impact on the environment. Did the results of this taste test show that the impact on the environment is worth it?
  - Share your results on social media and tag @ElkayezH2O.



### Options for additional tests

- Try testing chilled vs. non-chilled water. How does that change your ratings?
- Try choosing bottled water with different types of filtration (carbon filter, ultraviolet, reverse osmosis, distilled).

**ELKAY**



# Water Taste Test Rating Sheet

Rate each sample on a scale of 1 - 5  
(1=terrible; 2=not-so-great; 3=okay; 4=pretty good; 5=excellent)

Quality	A	B	C	D
Appearance				
Taste				
Texture				
Aroma				
After taste				
<b>TOTAL</b>				

## Sample A

Describe the taste: \_\_\_\_\_

Would you drink it regularly? \_\_\_\_\_

Additional comments: \_\_\_\_\_

\_\_\_\_\_

## Sample B

Describe the taste: \_\_\_\_\_

Would you drink it regularly? \_\_\_\_\_

Additional comments: \_\_\_\_\_

\_\_\_\_\_

## Sample C

Describe the taste: \_\_\_\_\_

Would you drink it regularly? \_\_\_\_\_

Additional comments: \_\_\_\_\_

\_\_\_\_\_

## Sample D

Describe the taste: \_\_\_\_\_

Would you drink it regularly? \_\_\_\_\_

Additional comments: \_\_\_\_\_

\_\_\_\_\_