

# WATER FILTRATION CHALLENGE



Did you know that the average American uses between 80 and 100 gallon of water a day?

The rest of world is not so lucky. The majority of people on the planet don't have running water in their homes. To get it, they have to find it, gather it and then carry it back from other sources like streams or rivers...and many of those aren't particular clean. Roughly one in eight people around the world don't have access to clean drinking water.

Depending on where they live, there could be all kinds of things in their water – fish and other wildlife, of course, but there could also be bacteria and microorganisms, trash, human and animal wastes, industrial wastes, toxic chemicals or other questionable substances. In fact, water-related disease is the second biggest killer of children worldwide.

What would you do if you turned on your faucet and no water came out? What if there wasn't any bottled water, either?

Where would you find water? Think of nearby bodies of water in your area. Is there a stream or river? A lake?

Would it be safe to drink it?

If not, what would you have to do to make it safe? What kind of pollutants would you need to filter out of it?

In this activity you will design, build and test filters that can remove pollutants from water.

## WHAT YOU'LL NEED:

### Polluted Water Sample Supplies:

- An empty water bottle with lid to mix and store polluted water
- Tap water
- Soil or potting mix
- Small pieces of Styrofoam or small pieces of newspaper
- Rice or beans
- Baking soda or salt
- Dishwashing detergent
- Vegetable oil
- Food coloring

### For the filter you'll need

- 2-liter bottle
- Paper towels, coffee filters or cloth scraps
- Sand
- Small pebbles
- Timothy hay or grass
- Horticultural or Aquarium charcoal (wash before using to remove any excess powdered residue)

## WHAT TO DO:

### To make a polluted water sample:

- Fill an empty water bottle about three-quarters full with tap water

Add:

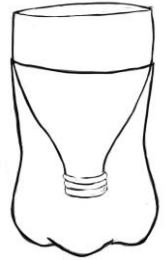
- A few drops of food coloring to represent toxic chemicals
- A few beans or pieces of rice to represent animal/human wastes
- Some soil to represent soil runoff
- A small amount of baking soda or salt to represent road salt
- A small amount of vegetable oil to represent motor oil
- And some torn pieces of paper or Styrofoam to represent litter

One of the first steps water treatment plants take is to aerate the water. Aeration is the process of passing large amounts of air to the water and then giving it a way to vent. This adds additional oxygen to the water and allows some of the dissolved gases trapped in the water to escape.

To simulate this, screw the lid tightly onto your bottle of polluted water and shake it vigorously at least 30 seconds. Remove the lid to allow the gases to escape for a minute or so and then repeat the process.

While the gases are venting, make a filter container by cutting a 2-liter bottle in half. Invert the top into the bottom to form a funnel and a catch basin.

To build your filter, select the filter materials that you think would be the most effective to use for each of the pollutants you want to remove. Be sure to consider how much of each material to use and the order that you want to put them in.



Once you have a plan, gather your supplies and layer them into the funnel.

After your filter is complete, slowly pour the water sample into your filter.

After the water has passed through, compare it to the polluted sample. What changes can you see? What adjustments could you make to your filter design to improve your results?

Make the modifications and test it again.

## SOMETHING TO THINK ABOUT:

Even if the water looks clean, is it possible that the water is still undrinkable?

Think about all of the microscopic organisms that are too tiny to see and possibly too small to filter. How could you kill those organisms?