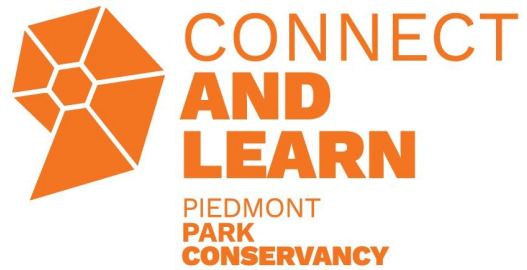


Water Filtration



Have you ever wondered how we remove pollutants from water so we can drink it, use it to bathe, and cook with it? Water goes through many steps in the purification process before it comes out of the tap for us to use. In this experiment, model one of the steps in the water purification process by designing and refining a device to filter pollutants out of water.

Key Terms

Pollution- introduction of harmful substances into the environment

Purification- removal of contaminants, in this case, from water

Filter- a device for removing solid particles from a liquid or gas passed through it

Materials

1 large 2 liter bottle (soda bottle works great) cut in half, horizontally
2-3 cups of “dirty” water (collected from outside, maybe a puddle; you can also make your own polluted water by adding food coloring, grass and plant clippings, dirt, pepper, or other items to represent pollutants)

Spoon (or something else to stir with)

A 3x3 piece of cloth (a piece of an old washcloth or tshirt works fine)

1 rubber band

Measuring cup

Filter Materials:

Pebbles

Sand

Soil

Coffee filter

Napkin

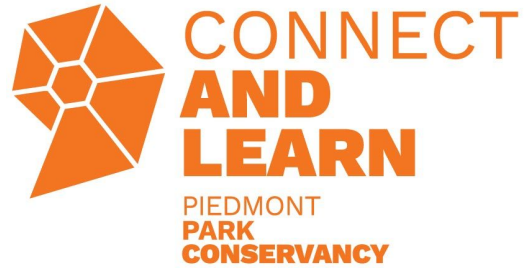
Paper towel

Cotton Balls

Procedure

1. Collect some dirty/polluted water from outside. If you cannot find any, or want to have some extra-dirty water to experiment with, you can make your own! Add a few drops of food coloring, dirt, pepper, baking soda, or any other ideas you might have! Get creative here. Make sure to stir up your polluted water so everything is incorporated.

Water Filtration



2. Prepare your filtration system. Cut your 2 liter bottle in half horizontally if not already done. Cover the mouth of the bottle with the piece of cloth and secure it by wrapping the rubber band around it. Place the bottle upside down into the bottom half of the bottle (the mouth of the bottle should be pointing down into the base). This will be the base of your filtration system.
3. Now it's time to test your filter materials! One by one, place your filter materials inside the top half of your filter. Pour $\frac{1}{4}$ cup of water into the bottle and wait for all the water to filter through. Repeat this step with each filter material. Be sure to record your results: which material(s) worked best to filter the pollutants out of the water?
4. Since we have tested each material individually, it is time to refine your filtration device. This is a time to think like an engineer! Combine your filtration materials however you like: in different layers, mixed together, whatever works best! Look back in your notes to see what worked best and try a combination of those materials!

Experiment Guiding Questions:

1. Describe the polluted water before it was poured into the filter: what color was it, was there anything floating in it, did it have a distinct smell?
2. Which materials filtered the best in the individual tests? Were there any materials that did work to filter the water at all?
3. What did the water look like after it was poured through each different filter? Did the color, smell, or consistency of the water change?
4. Once you were able to combine materials, what design/combination of filter components worked the best? Describe your design.
5. Are there any other materials you can think of that might help to filter/purify the water further?