Water Filter Challenge

Credit: Science World

Level: Grades 4-9

Overview:

In this activity, students will compete in groups to make the most effective filtration system for clarifying dirty water. While, this activity does not filter the water to reach drinking standards, it does help students explore the first stage of water treatment— **filtration**.

Clean water for us to drink is not always easy to find without us having to treat it first. The water that comes out of our taps in British Columbia goes through two types of treatment. It goes through **physical filtration** and **chemical disinfection** and is sampled before it is declared safe to drink.

The origin of our water is very important for our understanding of how we get our clean water. Most towns and cities get their water from lakes and rivers.

Water for human use is collected in reservoirs or containment areas, then, the water flows into tanks with sand or gravel for **physical filtration**. After physical filtration**,** even if the water looks clear, it does not necessarily mean that it is safe to drink. Water that is untreated or dirty can make us very sick, this is because there may be harmful microorganisms present. **Chemical disinfection** is done, using chemicals such as ozone, chlorine, or fluoride, which are added to kill bacteria, before water is piped to users.

In nature, water quality is also very important.

Water quality in nature has different factors than that for human use. A water system is not necessarily unhealthy if it looks dirty. This usually just indicates the type of surface below the water. There are human made chemicals, however, that we cannot see and are harder to treat. These chemicals can be bad for both us and the environment and include pesticides, pollutants, pharmaceuticals and soaps. These chemicals can accumulate in water systems as the water moves further downstream you go, and as the number of people using the water increases.

The cleaner we can keep our water, and the less we use, the easier it is on our treatment process, and all other cities and towns that share our water further down the line.

Objectives:

- Describe the process of water filtration before it gets to homes and taps
- Describe methods and the importance of water conservation
- Explore the effects of water pollution

Materials

Per Class:

- 5 pails with dirty water
- 5 tables or flat areas for stations
- 5 clear plastic 2L pop bottles
- gravel rocks

Any number of filtering items:

- Sand
- Rocks
- Porous clay
- Potting soil
- Saw dust
- Cotton balls
- Wood chips
- Cotton balls
- Coffee filters
- Powdered charcoal
- Alum
- Silt

Questions for Students:

- What does the water look like before and after filtration?
- Which filtration system made the clearest end water? Why?
- What was your group's strategy for your filtration system?
- What would happen if we filtered the water a second time?
- Does soil help filter our water?
- Is the filtered water clean enough to drink? What might still be in the water that filtration cannot remove?

Steps:

Preparation:

1. Cut all pop bottles off 4 inches below the mouth.
2. Place the top of the bottle upside down in the bottom section of the bottle (like a funnel.)

3. Place a few gravel rocks at the bottom of the funnel to close the gap from the cap.

Set-up:

1. At 5 separate tables, place 1 pail of dirty water, one cut and prepared pop bottle with gravel, and equal amounts of all available filtering items.
2. Divide the class into 5 groups corresponding to the 5 separate tables.

Challenge:

1. As a group, come up with a filtering system to turn the dirty water in the pail into the clearest sample.
2. Use the pop bottle funnel as your basic structure and use any of the items on the table as filtering devices.
3. You can use more than one, but you get only one chance at filtering the water.
4. Once all groups have completed their filtering system, watch one group at a time test how effective their system is for clarifying the water.

Teacher Tip: As another form of a challenge, limit the number of materials you provide for the water filtration challenge and see how creative your students can be with their designs.