
The Challenges – Teacher Resources

Water Treatment Demonstration

It is necessary to make our water clean, because our drinking water comes from both surface water and groundwater that can easily pick up all types of contaminants. Water that might look clean to drink may contain harmful bacteria or chemicals, not safe for drinking.

Water treatment plants purify and maintain the quality of our drinking water by taking it through a five-step process. This demonstration will allow students to explore the water treatment process and the changes that occur with our drinking water during each step of the process.

Materials

- Diagram of water treatment plant
- Two clear, 2-liter plastic soda bottles
- Water (half-gallon)
- Dirt (1 cup)
- Two large clear jars with lids (quart size)
- Cotton balls (several)
- Sand
- Small rocks
- Crushed charcoal
- Alum (2 tablespoons, may be obtained from grocery store)
- Bleach (2 tablespoons)



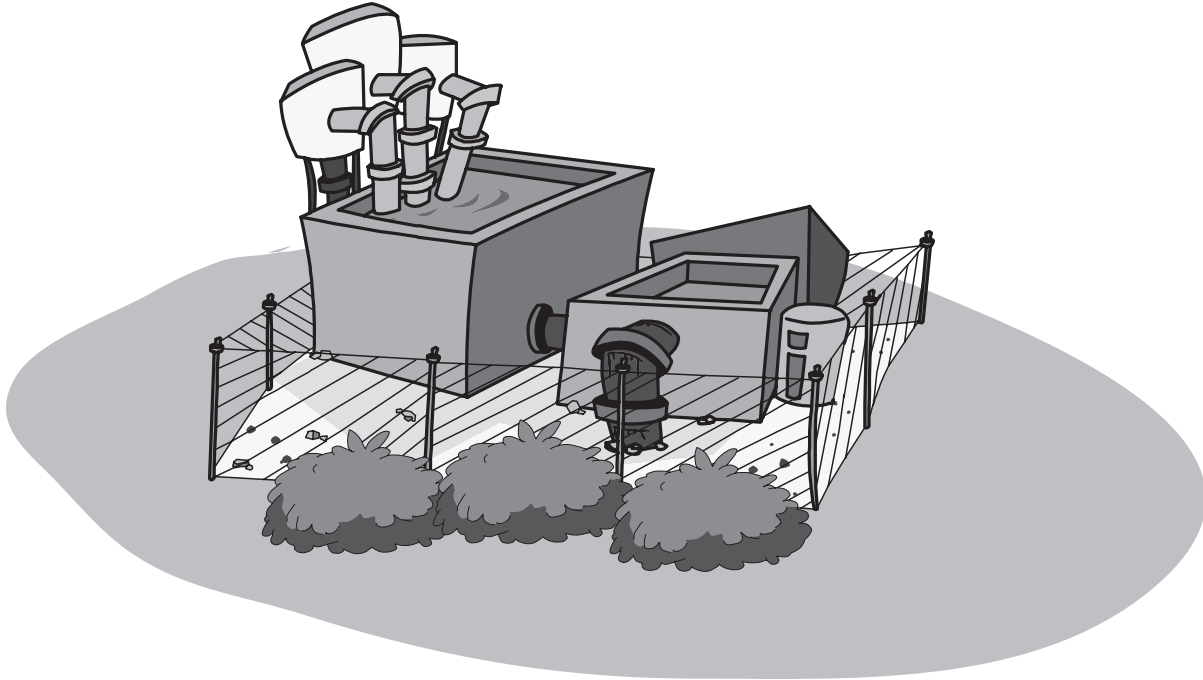
Advanced Preparation

1. Cut off the tops of the 2-liter bottles about 3 inches from the neck.
2. Prepare the “dirty” water by mixing the dirt into the half-gallon of water.
3. Create the filter by turning one of the bottle tops upside down. Put a cotton ball snugly in the neck of the bottle. Pour a layer of sand over the cotton, followed by the charcoal, more sand, and small rocks.
4. Clean the filter by pouring 1–2 gallons of tap water through the filter.

Demonstration Procedures

1. Use the diagram of the water treatment plant and review the five steps of the water treatment process (aeration, coagulation, sedimentation, filtration, and disinfection).
 2. Pour “dirty water” into one of the jars until it is about three-quarters full. Ask the students to describe the water.
 3. Place the lid tightly on the jar and shake for 30 seconds. Then use both jars to pour the “dirty water” back and forth 10 times. (Have students determine that this is step one of the process — aeration.) Ask students to note any changes they observe in the water from this process.
 4. Next, pour the aerated water into the bottom section of a cut bottle and add 2 tablespoons of alum. Stir the mixture slowly for three minutes. (Note that this is step two of the process — coagulation). Ask students to predict what they think might happen during this process.
 5. Allow the coagulated mixture to stand undisturbed about 20 minutes. (Discuss what will happen during step three of the process — sedimentation.)
-

The Challenges – Teacher Resources



6. Set the filter (made earlier) inside the bottom of the second cut bottle so that it will drain into the container.
 7. After the sediments are allowed to settle to the bottom (step four), carefully pour the top two-thirds of the water (without disturbing the sediment) through the filter and collect the filtered water in the container. (Note step five of the process — filtration.)
 8. After you have collected most of the water poured through the filter, add 2 tablespoons of bleach to the filtered water. (Safety glasses should be used when pouring the bleach.) The bleach represents the disinfection process.
 9. Ask the students if all of the water they started with was recovered. Discuss that a certain loss of usable water does occur during the treatment process.
 10. Compare the treated and untreated water. What changes have taken place? **IT IS IMPORTANT THAT STUDENTS UNDERSTAND THAT THIS IS A SIMULATION OF THE TREATMENT PROCESS AND THE WATER IS NOT SAFE TO DRINK.**
-