


 GO

[Fast Facts](#)
[Geography](#)
[History](#)
[Science](#)
[Conservation](#)
[Experiments](#)
[Groundwater](#)
[Hydrologic Cycle](#)
[Molecular Structure](#)
[Water Hardness](#)
[Water Pollution](#)
[Water Resources](#)
[Water Treatment](#)
[Youth Council](#)


### Select a science experiment:

[Chemical Concentrations](#)
[Clean Water](#)
[Water Density](#)
[Water Pollution](#)
[Soft or Hard Water](#)
[Surface Tension](#)
[The Water Cycle](#)

## Investigating Pollution

There are many ways that water can become polluted. Aside from natural pollution such as soil, leaves and living organisms, people cause the most serious pollution. From agricultural fertilizers and pesticides to urban runoff and industrial waste, pollutants can seep into groundwater that is often used as a source for drinking water.

Follow the instructions in this experiment to make polluted water and observe what pollutants may do to water supplies.

### You will need:

- 8 one-pint jars (four with tight-fitting lids)
- Masking tape
- Funnel
- Cotton
- Motor oil
- Vinegar
- Laundry detergent
- Soil
- Plastic cups or beakers

### Begin the experiment

1. Label two sets of jars. Number four of the jars (1,2,3 and 4) with masking tape. Make sure these four jars have lids that will fit tightly. Fill this set of jars half full of water. Number the other four jars (5,6,7 and 8) with masking tape and set them aside.
2. Observe the water in jar #1. Record your observations.
3. Put one tablespoon of motor oil in jar #2. Tighten the lid and shake the jar carefully. Record your observations.
4. Put a tablespoon of vinegar in jar #3. Tighten the lid and shake the jar carefully. Record your observations.
5. Put a tablespoon of detergent in jar #4. Tighten the lid and shake the jar carefully. Record your observations.
6. Place a piece of cotton in the funnel and then add some soil. Place the funnel on empty jar #5.
7. Pour the contents of jar #1 (water only) into the funnel and let it drip through the funnel into jar #5.
8. Move the funnel with the cotton and soil to empty jar #6. Pour the contents of jar #2 (oil and water) into the funnel and let it drip through the funnel into jar #6. Observe and record your observations.
9. Move the funnel with the cotton and soil to empty jar #7. Pour the contents of jar #3 (vinegar) into the funnel and let it drip through the funnel into jar #7. Observe and record your observations.
10. Move the funnel with the cotton and soil to empty jar #8. Pour the contents of jar #4 (detergent) into the funnel and let it drip through the funnel into jar #8. Record your observations.

### Making Discoveries

1. If these substances were added to a real water source, how might they affect the water?
2. How might animals and people be affected?
3. Can you think of instances where materials such as these (oil, chemicals, detergent, etc.) might have been spilled or dumped and possibly endangered a water supply?

4. What measures might a community take to prevent such accidents?


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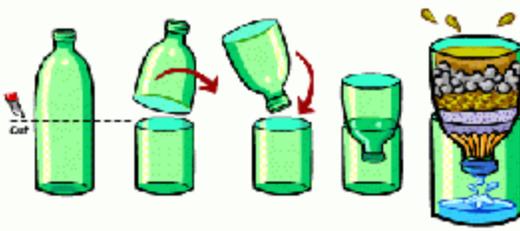
## Clean the Water

In this experiment, you will be able to describe the process that [water treatment](#) facilities use to treat water for drinking and demonstrate the operation of a water treatment facility.

### You will need:

- Paper (to record your findings)
- Scissors
- Bleach
- Cotton
- Clock
- 2-gal. (8L) jug of water
- 2-liter plastic bottles
- Alum (a spice found in most supermarkets)
- 5 cups (600 mL) of soil
- Funnels
- Fine gravel

### Begin the Experiment:

1. Use the funnel to pour about 1.4 L of dirty water into the 2-Liter plastic bottle with cap. The dirty water can be made by adding five cups of soil to two gallons of water. Describe the appearance of the water on paper.
2. Put the cap on the bottle and shake for about 30 seconds. Continue the process by pouring the water back and forth between two bottles 10 times. Record what part of the [treatment process](#) this action represents.
3. Pour the water from step two into a 2-liter bottle with the top cut off. Add two tablespoons of alum to the water. Stir the mixture slowly for about five minutes. What [process](#) is occurring?
4. Allow the water to stand undisturbed for 20 minutes. Observe the water at five-minute intervals and record your observations. What [process](#) is occurring here?
5. Cut the bottom from another 2-liter or 3-liter bottle. Construct a filter using cotton and the cheesecloth and plug the neck of the bottle with the filters. Secure with a rubber band.
 
6. Pour the fine sand over the cotton plug followed by activated charcoal, coarse sand, fine gravel and coarse gravel. Clean the filter by slowly pouring through 4-8 liters of clean tap water.
7. Place the filter over the bottom part of another bottle. Without disturbing the sediment in the container with the alum, pour the top two-thirds of the water through the filter. What [process](#) is occurring?
8. After waiting until more than half of the water poured through the filter has been collected, add two tablespoons of bleach to the filtered water. What part of the [treatment process](#) does the addition of bleach represent?

9. Record the differences in appearance and odor. Examine both treated and untreated water with a microscope and record your observations.
10. Write a brief report explaining how a water treatment facility purifies water for drinking. Check out our interactive version of the [water treatment](#) process.