

Clean Water!

Within the Las Vegas Valley, 85 percent of the community's water comes from Lake Mead, while 15 percent is groundwater. Surface water can contain impurities that may make it look bad, taste bad, smell bad and/or cause illness. Water that looks clean may contain harmful bacteria or chemicals that can cause disease. It takes the efforts of federal, state and local governments, as well as the Southern Nevada Water Authority, to keep our community's drinking water safe.

The Safe Drinking Water Act and its subsequent amendments set the standards for public drinking water supplies. The Environmental Protection Agency is charged with ensuring that these standards are met. Employees at Southern Nevada Water Authority treatment facilities continually test water to make sure it is free of disease-causing substances.

Water treatment facilities clean and maintain the quality of water through the following processes: (1) aeration, (2) coagulation and/or flocculation, (3) sedimentation, (4) filtration and (5) disinfection. [Please refer to *Glossary* for definitions.]

The following activities are designed to assist students' understanding of how water is cleaned for use by the community's residents.

Activity #3:

Clean the Water!

Objectives: Students will be able to describe the process that water treatment facilities use to treat water for drinking and will demonstrate the operation of a water treatment facility.

NEVADA SCIENCE STANDARD 16:8

Teacher Note: You may wish to use the overhead transparency of our water treatment process, found at the beginning of Unit Three.

Time: Two or three class periods

Materials:

Data Sheets	2-gal (8 L) jug of water	5 cups (600 ml) of soil ¹
scissors	several 2 liter plastic bottles	funnels
stirring rod	alum ²	bleach
fine sand	coarse sand	fine gravel
coarse gravel	activated charcoal	cotton
tap water	cheesecloth	clock

Procedure: (per group)

1. Use a funnel to pour about 1.4 L of “dirty water”¹ into the 2-liter plastic bottle with cap. Describe the appearance of the water. (Place your response on the Data Sheet.)
2. Put on the cap and shake for about 30 seconds. Continue the process by pouring the water back and forth between two bottles ten times. What part of a treatment process does this represent? (Place your answer on the Data Sheet.)
3. Pour the aerated water from step 2 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? (Place your response on the Data Sheet.)

¹ Dirty water can be prepared by adding approximately 5 cups of soil to two gallons of water.

² Alum can usually be found in the supermarket spice section.

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? (Place your response on the Data Sheet.)
5. Cut the bottom from another 2-liter or 3-liter bottle. Construct a filter as indicated in the attached diagram.
 - a. Turn the bottle upside down. Loosely put a cotton plug in the neck of the bottle and cover the neck of the bottle with a piece of cheesecloth secured with a rubber band.
 - b. 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.
6. 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? (Place your response on the Data Sheet.)
7. 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? (Place your response on the Data Sheet.)
8. Record the differences in appearance and odor. Examine both treated and untreated water with a microscope and record observations.

Activity #3:

Clean the Water - Data Sheet

Record your responses below.

1. Describe the appearance of the water.

2. What part of the treatment process does this represent?

3. What process is occurring?

4. What process is occurring over the 20-minute period?
 - a. Observations?

 - b. What process is occurring?

6. What process is occurring?

7. What part of the treatment process does the addition of bleach represent?

8. a. Differences in appearance and odor:

Treated Water

Untreated Water

- b. Microscope Observations:

Treated Water

Untreated Water

Follow-up: Write a brief report explaining how a water treatment facility purifies water for drinking.

FILTER MODEL

