



IMPORTANT:

Read all instructions before proceeding

WATER POLLUTION AND SOLUTIONS

OVERVIEW: Students will discuss the various ways we use water. They will be introduced to the concepts of conserving water and how some chemicals may be used to treat water. Students will observe an oil spill and share ideas of how it may be cleaned up

OBJECTIVE: To introduce students to water treatments and how we get our water we use

GRADE LEVEL: 3

COMMON CORE STANDARDS:

Grade 3 Earth and Space Science:

Earth's nonliving resources have specific properties.

Some of Earth's resources are limited.

TIME: 45 minutes

VOCABULARY

Aquifer, conservation, filtration, oil slick, control, resource

MATERIALS (PER GROUP OF 2-3 STUDENTS)

*Grated soap (one heaping spoonful)

*6 clear plastic cups

*1/2 tsp. Salt

*1/2 tsp. Epsom Salt

*3 straws

*4 cone-shaped coffee filters

*2 plastic spoons

FOR DEMO:

*2" flat pancake of clay

*1/4 inch play sand for bottom of clear cup

*1/2 inch of gravel

Materials continued:

*Food coloring

DEVELOPED BY:

Marcee Graymire, 1995-1996 BP Teacher in Residence

Tracey Poling, 1996-97 Teacher in Residence

Modified to fit Common Core: Kathy Buescher

PROCEDURE:

Living things need water to survive. Unlike most animals which take in water simply to keep themselves alive, humans use water for many other purposes. We use water to irrigate land, wash clothes, do dishes, flush the toilet, make products, cook food, and many other things.

STEP 1: WATER DISCUSSION AND ACQUIFER

1. Ask students to name some ways we use water. Share with them that less than 1% of the water on Earth is fresh water that people can use for these purposes.
2. Just as with our other precious resources, we need to work on conserving water. Ask for volunteers to explain the definition of conservation. (Don't use more than we need, keep it clean, etc.)
3. Discuss the water cycle. Groundwater we use today has travelled through the hydrologic cycle 1000's of times. It reappears at the surface of discharge areas. These typically are low areas such as lakes, rivers, and wetlands. Many communities obtain drinking water from an underground source called an AQUIFER. Water suppliers/utility officials drill wells through soil and rock for water to supply the area. Discuss country wells versus city water and needs to purify. Aquifers are where water is retained underground that they drill to and need to purify before drinking. Unfortunately, water can become contaminated by harmful chemicals such as oil, lawn care chemicals, etc. Ask students for other examples of pollutants. Create the aquifer and demonstrate pollution.

CREATING THE AQUIFER:

1. Pour 1/4" of sand into the cup. Pour some water on top of it and remind the students that the sand is highly porous.
2. Cover 1/2 of the sand with the clay. Press the clay to one side of it. Place a few drops of water on the clay to demonstrate how water will stay on top of it and not flow through.
3. Next, place some rocks over the sand and clay. Slope the rocks to 1 side. This represents hills and layers of the Earth's surface. It makes a lake. Pour enough water to mostly fill the cup and tell the students that it represents ground and surface water.
4. Put a few drops of dye close to the wall of the cup at the rock hill. This represents pollution. Watch, and discuss what happens. The dye eventually leaches into the aquifer, just as ground pollution does.

STEP 2: FILTERING WATER

1. The water that people use at home goes down the drain and has to be cleaned so that it can be used again. Over the years, scientists have developed ways to clean water in water treatment plants so that used water can be put safely back into rivers and streams and eventually used again. As part of most water treatment, a substance is added to the water to make certain kinds of particles in the water sink to the bottom. Different types of filtering systems are then used to clean out many of the remaining impurities.
2. Today we are going to be scientists and experiment with several different kinds of materials to find which kind will work the best to clean up some cloudy water. If we were actually working in a laboratory such as the ones we have at Husky, we would be experimenting with different chemicals to find which ones work the best to clean the water. For our purposes today we will use several different kinds of salt to see which one works best.

3. Distribute materials to pairs of students. Each pair will have 2 cups labeled salt, 2 cups labeled Epsom salt, 1 mixing cup, and one control cup for comparisons. Fill the mixing cup approximately $\frac{3}{4}$ full of water. Allow students to add 1 heaping spoonful of grated soap to the water and use a straw to mix thoroughly.
4. Have students pour $\frac{1}{3}$ of their water and soap mixture into one of the cups labeled salt, $\frac{1}{3}$ into the cup labeled Epsom salt, and $\frac{1}{3}$ into the control cup. Place a coffee filter in each of the other two labeled cups. Make sure that there is a space of about 5-cm between the bottom of the coffee filter and the bottom of the cup.
5. Add $\frac{1}{2}$ teaspoon of salt and $\frac{1}{2}$ teaspoon of Epsom salt to the soap and water mixture in their labeled cups. Do not add anything to the soap and water mixture in the control cup. Discuss why you add nothing to the control cup. (We use the control in an experiment to make comparisons.) Stir each one with a separate straw for about 1 minute.
6. Pour the mixture from each cup into its matching filter. Observe the liquid that drips through the filter and into the cup. Do you notice a difference in the way the liquid looks in each cup? When the dripping slows down, look into the coffee filters and compare what you see.

7. Questions to discuss:

Did the table salt or the Epsom salt seem to do a better job of cleaning the water?

Do you think some of each salt may have flowed through its filter?

When scientists develop chemicals to clean water in ways similar to this, what are some of the things that they need to think about?

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RECYCLING WATER

Today we're adding different types of salt to polluted water to find out which chemical works the best to clean the detergent out of water so the water can be used again.

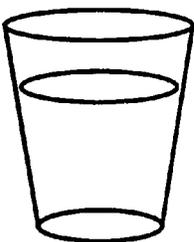
CUP A—CONTROL CUP

CUPS B—TABLE SALT

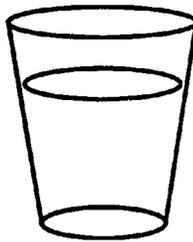
CUPS C—EPSOM SALT

1. Observe cups A, B, and C.
2. What color is the liquid in each cup after it has passed through the filtering process? Is it dirty, cloudy, or clear? Write your answers below the cups.

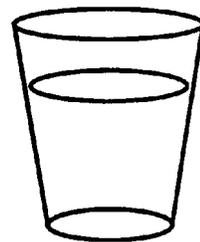
Cup A



Cup B



Cup C



Compare cups A, B, and C. How are they alike?

How are they different?