

STUDENT ACTIVITY

SHEET

How Clean Is Clean?

Introduction

In comparison with rivers or streams, water in the ground moves very slowly and very calmly in rivers that are very wide - sometimes more than one hundred miles wide. These slow underground rivers are called aquifers. Many of us get our drinking water from aquifers. When a pollutant is spilled on the ground, it slowly seeps down and can get into an aquifer, making our water unsafe to drink. When our aquifer gets polluted, we need to get answers to many difficult questions like how toxic are the pollutants?, how fast are the pollutants moving in the aquifer?, and how difficult are they to remove from the aquifer?

In this activity, the class is divided into at least 4 groups. Each group will experiment with a different kind of pollutant to find out how difficult it is to remove the pollutant from a sponge. Aquifers are not really spongy, but we can still use a sponge to give us some idea of what happens when an aquifer gets contaminated.

Group 1 will use soap as its pollutant. In this case, the ground is contaminated when a tanker truck gets into an accident on the highway and spills the pollutant on the side of the road. The soap is a lot like real pollutants which dissolve in water but are not hazardous or toxic.

Group 2 will use salad as its pollutant. Again, a truck accident has caused the spill as for Group 1's pollutant. The oil is a lot like gasoline which is hazardous and toxic, but does not mix well with water.

Group 3 will use gelatin as its pollutant. This time the pollutant has leaked into the ground from a large old and rusty underground tank where it has been stored for years. The gelatin is a lot like pesticides which dissolve in water and are toxic.

Group 4 will have the worst troubles. An explosion has occurred at a major chemical plant, and all three types of pollutants - soap, oil and gelatin - have been spilled onto the ground.

Objective

You will investigate how pollutants contaminate an aquifer by using a sponge as a simple model of an aquifer.

General Procedures

1. One student in each group should pre-moisten their

sponge by soaking it in water, then squeezing it until it is just moist to touch. Other students in each group should be sure they have the following items at their work station:

- One large cup of clean water
- Two empty large cups
- Tray or bucket for collecting rinse water
- One paper or plastic dinner plate
- Small cup containing a "pollutant"

After these materials have been collected, wait for the teacher to read over the Introduction with the class.

2. Place the sponge on the plate and pour the liquid "pollutant" in the small cup onto the sponge, letting the sponge soak up as much pollutant as possible.

3. SLOWLY pour clean water onto sponge, letting it soak in until the sponge is full. Pour back into the cup any excess water on the plate. You will need to know how many cupfuls of water are being used to rinse the sponge, so keep track of all the water you use.

4. Lift the sponge and squeeze it out completely, catching the water in an empty large cup.

5. Pour more water onto the sponge, letting it soak in.

6. Squeeze out the sponge again, this time using the other empty large cup to catch the water squeezed from the sponge.

7. Compare the two cups of polluted water. Decide which cup seems to have the most polluted water, then empty this cup. Set aside the cup containing the water which looks less polluted.

8. Repeat Steps 5, 6 and 7 each time comparing the water in the two cups to decide whether the water is getting cleaner each time the polluted sponge is rinsed out. Count the number of times the sponge is rinsed.

9. Estimate to the nearest 1/4 cup, how many cupfuls of water were used to rinse the sponge. Convert to ounces (One cupful equals 16 ounces). How much more rinsing - if any - must be done before the water squeezed from the sponge would be "safe" to drink?

10. After you have finished the experiment, return materials to the proper place, then get ready to report your results to the class.

