

Bitter Water Blues

Standards of Learning

Science 6.1, 6.5, 6.7, 6.9, LS.1, LS.11, LS.12

English 6.1, 7.1

Social Studies USII.2

Objective

Students will

- observe how ground water transports pollutants, and simulate ground water testing to discover the source of contamination.

Materials

- 1 cup per group filled with sand
- 1 clear pan
- Water
- Misting bottle
- Grape-flavored powdered drink mix
- Lemonade-flavored powdered drink mix

Background Knowledge

People believe that groundwater is safe and protected by layers of soils which must be permeated for water to enter the water table. Agricultural best management practices are geared to further reduce risk of water contamination.

The cycle of the Earth's water is continuous, carrying and spreading pollutants introduced by human activity all around. Intensive farming uses chemical fertilizers responsible for various forms of air and water pollution. Animal dung introduces large quantities of nitrate into the soil; the nitrate then filters into the water table. Certain underground gas tanks leak, discharging hydrocarbons into the water table. Pesticide residue is found in the water table and in watercourses; it makes water unfit for consumption. Wastewater leakage from a dwelling's underground tank contaminates the water table. Vast expanse of underground water fed by rainwater filtering through the earth; it supplies springs and can be collected in wells. Burying household waste without taking any particular precautionary measures leads to contamination of the water table. Untreated, it contains organic matter and potentially pathogenic substances that cause infection and promote the growth of algae. Pollution causes by leaks from refineries and offshore drilling platforms, by ships emptying their fuel tanks at sea and by oil spills. Radioactive nuclear waste was once immersed at the bottom of the ocean; it has a life span of up to 1,000 years. Industrial waste is highly variable; its principal components are lead, mercury, cadmium, hydrocarbons and acid deposits.

Use this experiment to introduce your class to how little contaminant is needed to affect water quality. Lead the class to explore what practices our society uses to protect our water supply. Bring forth examples such as demolishing old gas stations, landfills, suburban runoff, and agricultural factors. Consider making a plan to test for water quality and remedy unacceptable results.



Procedure

1. Poke small holes in the bottom of the cups and pass them out to small groups of students that you have formed (2-3 students per group)
2. Take three cups and add to one cup sand mixed with the grape-flavored powder, to the second add sand with lemonade flavored powder, and to the third add plain sand.
3. Have students make predictions as to whether or not their sand is polluted, by looking at it. Record their predictions on the board.
4. Have one student pour water into the cup and allow the water to filter through it into another container. Have students hypothesize what has colored the water.
5. Write the results on the board and compare, (see discussion questions 1-4)

Second half of experiment:

1. Prepare a tray with sand and bury a small amount of grape powder close to the top. (Make sure that you know where you buried it.) This represents buried contaminate.
2. Ask students to predict what will happen to the substance buried underground when it rains.
3. Represent years of rainfall by gently spraying the pan with water for 5-10 minutes or until the sand is saturated.
4. Lift the pan and show the bottom. A streak of purple should originate from the source and follow the flow of water as it filters downhill. Discuss with the students.

Discussion Questions

- Have you ever heard of a situation where water in the ground got contaminated? And how was it contaminated?
- What are some ways that we pollute our water?
- Was it easy to determine which cups had pollutants? Can pollutants always be easily seen?
- What are some ways other than sight, which we can identify to determine if our water is in danger of pollutants? (Are there factories, farms, parking lots near by, does the water smell, water testing strips)
- How can we have an affect on our water supply? (What do we do that helps/or adds to pollution)
- What if a community well field or homes with private wells were pumping water from a contaminated area?

