

# Clean It Up!

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## **Standards of Learning**

Science 6.1, 6.5, 6.7, 6.9, LS.1, LS.7, LS.8, LS.12

## **Objective**

The student will

- explain reasons for water quality degradation, understand challenges in determining water quality standards, and provide examples of best management practices in water filtering.

## **Materials**

- 3 clear disposable plastic cups
- Kitty litter
- Food coloring
- Sand
- Aquarium charcoal
- Almond extract
- Gravel
- Coffee filter
- Water

## **Background Knowledge**

You are employed by the local water authority. Residents are complaining that their tap water looks cloudy and smells funny. Determine if the water is safe and how to provide the community with high quality water. Hypothesize regarding the causes of the problem and how best to handle the community complaints.

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.



### **Procedure**

1. Fill one plastic cup half full of water. Add food coloring and almond extract.
2. Poke a small hole in the bottom of the second cup. (a dissecting needle works well to make the holes)
3. Layer various materials in cup to serve as a filter. Record amounts and layering order.
4. Place the third cup under the second to collect water as it filters through the second cup.
5. Pour the water from cup one (the water sample) into cup two (the filtering system), and analyze the results in cup three (the filtered water).
6. Record data regarding which materials were used to clean the water sample, in what combination, and to what extent. Was the filtering successful? Draw conclusions about your hypothesis.

### **Extension Ideas**

- Discuss what criteria should be used in determining water safety?
- Suggest prevention practices which may increase clean water levels.
- How do you successfully encourage the community to participate in clean water practices?
- Conduct the experiment using one variable at a time. Record time which each variable takes to run as well as water quality.

Lesson plan adapted from ***Agriculture and the Environment Clean It Up!*** From American Farm Bureau Foundation for Agriculture in the Classroom copyright 2004.



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<i>Filtering Devise</i>	<i>Time</i>	<i>Color Filtered</i>	<i>Amount</i>	<i>Independent Variable</i>	<i>Dependent Variable</i>
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**Control**

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**Filter**

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**Kitty Litter**

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**Sand**

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**Charcoal**

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**Gravel**

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**Combination  
#1**

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**Combination  
#2**

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**Combination  
#3**

