Water Filtration Challenge



Grade: 4th Grade | **Topic:** Water Filtration Challenge | **Measurement:** US Customary (cups, ounces, inches, etc.)

Purpose

This experiment shows how different materials can clean dirty water by filtering out dirt and particles. It helps us learn how filters work to make water clearer and safer to use.

Hypothesis

If I create a filter using layers of different materials, then the water will become clearer because the materials will trap dirt and particles.

Materials

- Empty plastic water bottle (16 ounces)
- Coffee filter or paper towel
- Rubber band
- Clean sand (about 1/2 cup)
- Activated charcoal (about 1/4 cup, available in pet stores or online)
- Cotton balls (5-6 pieces)
- Dirty water (mix soil or dirt with tap water)
- Clear cups or jars (2 for before and after water)
- Measuring cups
- Scissors (for adult use)
- Tray or plate (to catch spills)

Procedure

- 1. Have an adult carefully cut the bottom off the plastic bottle to make a funnel shape.
- 2. Turn the bottle upside down (cap side down). Place the coffee filter or paper towel inside the neck of the bottle, securing it with a rubber band if needed.
- 3. Add 2 tablespoons of cotton balls on top of the coffee filter.
- 4. Next, add 1/4 cup of activated charcoal on top of the cotton balls.
- 5. Then add 1/2 cup of clean sand on top of the charcoal layer.
- 6. Slowly pour about 1 cup of dirty water into the top of the filter.
- 7. Place a clear cup or jar under the bottle to catch the filtered water.
- 8. Watch the water drip through the layers and collect in the cup below.
- 9. Compare the dirty water and the filtered water by looking at their color and clarity.
- 10. Record your observations about how clear the filtered water is.

Results

The filtered water should look clearer than the dirty water, with fewer visible dirt particles. Some dirt and large particles are trapped in the sand and cotton layers, while the charcoal helps remove smaller impurities and odors.

Conclusion

The materials in the filter worked together to clean the dirty water by trapping dirt and particles. This shows how natural filters can help make water safer and cleaner.

Learning Objectives

- Understand how filtration removes dirt from water.
- Learn to build a simple water filter using household materials.
- Observe changes in water clarity after filtration.
- Practice making hypotheses and recording results.

Teacher Notes:

Key Concept: Water filtration is a process that removes impurities from water by passing it through layers of material that trap dirt and particles. Each layer in the filter has a special job, like catching large pieces or absorbing smaller impurities.

Answer/Explanation: The sand catches larger dirt pieces, the cotton helps hold particles back, and the activated charcoal removes smaller impurities and odors. While this simple filter improves water clarity, it does not make water safe to drink because it does not remove harmful bacteria or chemicals.

Teaching Tips:

Supervise children when using scissors and handling activated charcoal. 2. Encourage students to make detailed observations and compare before and after water samples. 3. Discuss why water may still not be safe to drink after filtering. 4.
Suggest trying different materials for filtration and comparing results.

Relevant Standards: NGSS 4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment., NGSS 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well they meet criteria and constraints.

Name:	Science
Date:	Coperiments
Experiment Title:	
Purpose: (I wonder)	
Hypothesis: (I think)	
Materials:	
Procedure:	
Results: (What happened?)	
Conclusion: (I learned)	