Water Filtration Activity for E Week

INTRODUCTION

Water is a valuable resource that is often taken for granted. Water is necessary for survival and having clean water to drink is a luxury. In most of the United States, we are lucky to have clean water, but that is not always the case. Sometimes, engineers must treat our water so it's safe before it comes to our faucets.

Ask questions to get participants thinking about water:

- Why do we filter water?
- How do we know if water is drinkable or not?
- Is there water that you are around that you don't drink? Why or why not? (swimming pools, lakes, bath water)

ENGINEERING CONNECTIONS

Civil, environmental, materials, and mechanical engineers all contribute to developing technologies and systems to purify unclean water. Purifying water can be difficult if a large amount is very polluted. Engineers help to purify this water so that people can live with water that is healthy to drink and bathe in.

SCIENCE CONNECTIONS

Typical water purification steps are aeration (adding air to water), coagulation (pulling together dirt and other solid particles in the water), sedimentation (gravity pulling heavier clumps to the bottom), filtration (separating the dirt from the clean water), and disinfection (treating the water to remove bacteria). Today, we will be focusing on the filtration step.

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Water Filtration Activity

This experiment explores the very basic idea of a water filter – something vital to everyday living, especially when it comes to drinking water. Students will filter a liquid through a plastic bottle with sand and charcoal, where the layers of sand hold solid particles and layers of charcoal absorb the main pollutants to create cleaner water.

MATERIALS:

- Plastic bottle
- 3-4 cotton balls
- Charcoal powder
- Sand
- Testing Liquid: i.e. pond water, orange juice, coffee, soda, Gatorade, etc.
- Scissors or X-Acto knife
- Safety gloves for cutting
- Goggles
- Baby wipes or rag for cleanup

INSTRUCTIONS:

1. Cut the bottom 1/3 off a plastic bottle.
2. Flip the top (cap-end) of the bottle into the base of the bottle that you removed – this will allow the cap-end of the bottle to stand in the bottom of the bottle.
3. Stuff 3-4 cotton balls in the bottle top to keep the sand and charcoal powder from going through the filter.
4. Place in layers of sand then charcoal; alternating until the plastic bottle is 2/3 full. Make sure to end with sand.
5. Select the testing liquid of your choice and hypothesize about how the filter will function.
6. Run the testing liquid of your choice through the plastic bottle and observe what is filtered (oil, color, particles, etc.).

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HINT:

You can add a couple of tablespoons of water to the cotton balls before adding the sand and water. It takes a long time for the liquid to soak through the cotton ball, so if you are short on time this can quicken the process.

SOURCE

How to make a water filter with sand and charcoal (DIY experiment) - YouTube

OBSERVE

What was filtered from the water the most and why? What other materials would work well for filtering? What materials would not work well as a filter?

LEARN

- Talk about different types of disinfection that can be used to create clean water and why it's important. Chlorine, UV, boiling - for example - and which types of disinfection can you use in the classroom vs. ones that are used in water treatment plants.
- Talk about water distribution systems and why drinking water is under pressure.
- Research more about water towers and how they work.