Dirty Water vs. Clean Water

The "Dirty Water vs. Clean Water" activity offers a practical demonstration of how natural water sources undergo initial filtration before becoming safe for human use. By constructing a simple filter using household materials, participants can observe how physical filtration removes visible impurities and understand why further treatment steps, such as disinfection, are necessary.

This hands-on experiment introduces important concepts related to water quality, environmental health, and the role of treatment processes in preventing the formation of harmful disinfection by-products.

It is particularly effective in promoting awareness of safe water practices among younger participants in a home setting.

Materials:

- 1 plastic bottle cut in half (or a large funnel)
- Cotton (or a coffee filter)
- Clean sand
- Small pebbles,
- Activated charcoal (optional but ideal to simulate advanced treatment)
- 2 plastic cups
- Spoon or stick for stirring
- Dirty water (prepared with: soil, leaves, small pieces of paper, and a bit of brown/green food colouring).

(cont.)

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Dirty Water vs. Clean Water

Activity Steps:

Prepare the dirty water:

In one cup, mix water with soil, leaves, paper bits, and food colouring.

This represents river water before treatment!

Assemble the filter:

Turn the top half of the bottle upside down to use as a funnel.

Layer the materials in this order:

Cotton (at the neck of the bottle) → Activated charcoal (if available) → Sand → Pebbles

It should be cleaner, though possibly still cloudy!

Filtration:

Slowly pour the dirty water into the filter.

Observe the water that collects in the cup below.

Guiding Questions:

- Did the water become completely clean?
- What else would be needed to make it safe for drinking?
- Why is it important to remove organic matter before disinfecting with chlorine?
- What steps would follow in a real water treatment plant?

Drawing/Report:

Participants can draw their filter setup and describe what they observed, including the condition of the water before and after filtration.

Have Fun!

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Answers

Did the water become completely clean?

No, the water became clearer, but not completely clean. While many visible particles were removed, the water may still contain microorganisms, chemicals, or dissolved substances that are not removed by simple filtration.

What else would be needed to make it safe for drinking?

Additional treatment steps would be needed, such as disinfection (e.g., chlorine or UV light) to kill harmful microbes, and possibly chemical treatment or advanced filtration.

Why is it important to remove organic matter before disinfecting with chlorine?

Because organic matter can react with chlorine to form disinfection by-products (DBPs), which can be harmful to human health.

What steps would follow in a real water treatment plant?

Coagulation and flocculation – chemicals are added to bind small particles into larger clumps; Sedimentation – the clumps settle out; Filtration – through layers of sand, gravel, and charcoal to remove remaining particles; Disinfection – using chlorine, ozone, or UV light to kill pathogens; Storage and distribution – clean water is stored and then piped to homes).

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