

WATER FILTRATION

SUPPLIES:

- 3 translucent plastic water bottles, such as a disposable water bottle or two liter bottle.
- A few coffee filters per bottle
- About 2 cups of sand (regular, but play sand would work)
- Cotton balls
- A few pebbles
- Scissors or utility knife
- Around 1 quart of dirty water*
- A few drops of bleach.
- If you have access to it, activated charcoal.
- Microscope to examine samples



THE SETUP:

You will need to set up the bottles for the experiment. About $\frac{1}{2}$ of the way up the bottle, cut around the circumference of the bottle. Flip the top into the bottom, neck down, and you'll be ready to experiment!

THE SCIENCE:

Water filtration by nature takes years. But, say you're out hiking and you don't have years to quench that thirst. How can you take potentially contaminated water and clean it up enough to drink?

Nature filters it through several feet of sand, which drags out contaminants and microbes. A quicker facsimile of this is a filter to remove big particulates, then a couple drops of bleach per gallon of water to kill microbes - and time.

THE EXPERIMENT:

Invert the top of the bottles into the base of the bottle so it makes a funnel going down. Put a coffee filter in the bottom of each funnel. From there, you get to choose your own adventure.

Make one funnel simple, by adding just another coffee filter or a cotton ball or drilled a hole in the lid and add a little sand.

Make a second funnel with 3 layers of things for the water to filter through.

And, in the third you'll make a "proper" filter. After the first coffee filter you'll layer in a bit of sand, another coffee filter, spread out cotton ball, a few pebbles, and if you have it, activated charcoal.

**The role of activated charcoal is that it will catch big particles, but also has an electrostatic attraction for microbes. This is why commercial filters and fish tanks use them. However, not many people just have it laying around the house unless you're a prepper or have fish.*

Now, carefully stir up the dirty water so the particulates are free floating. Then, slowly pour some over each funnel. (The more layers it has to go through, the slower it will go. The last funnel will be very slow.) Make sure you leave some dirty water left for analysis under a microscope that hasn't gone through a filter.

NEXT LEVEL:

What does it visually look like? Does it look cleaner?

What about on a microscopic level? If you have a microscope, now's the time to break it out and prepare a before and after slide.

Can you see the same things with a hand magnifier?

Draw what you saw.

What do you have that can kill these wiggling bacteria, protozoa, and amoeba?

Separate your filtered water into smaller amounts. Add a drop or two of each thing you came up with to kill the hidden life. Then, look again at your sample under the microscope.

Finally, add a drop of water per liter of water (4 - 5 drops per gallon), shake the sample, and then let it sit for a few moments. Then, look at your sample under the microscope. You should see that you have mostly pure water now.

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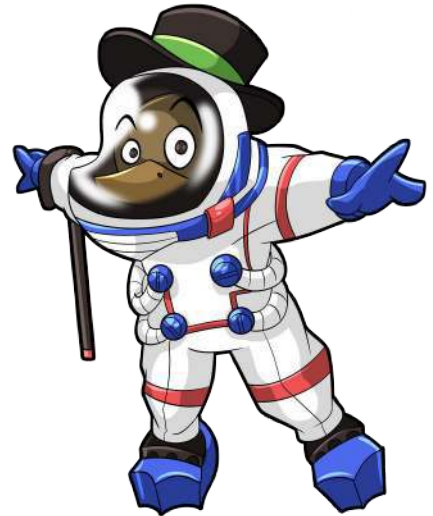
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