Path to Purification

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ESSENTIAL QUESTION

What filtration material makes the cleanest water?

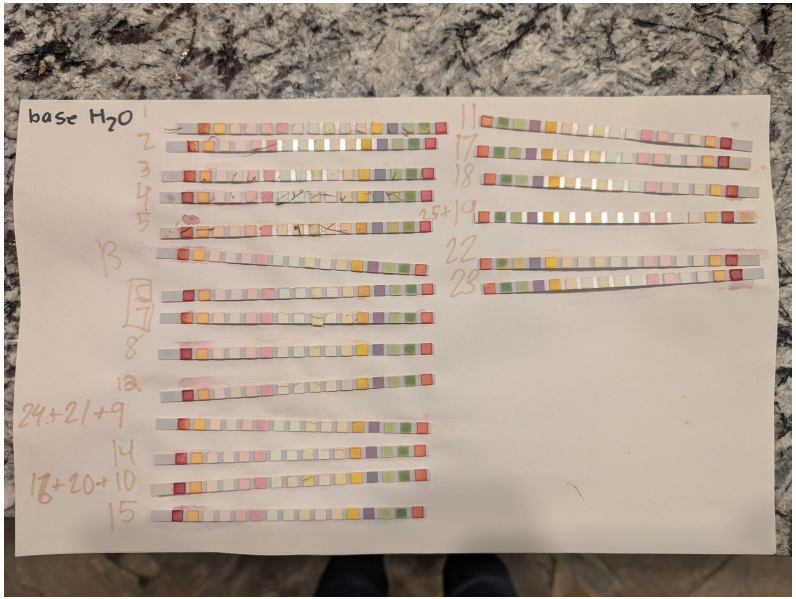
PURPOSE and HYPOTHESIS

The purpose of this experiment was to filtrate water using 5 different materials to see which one would create the cleanest water.

My hypothesis is if ions in a water filtration system are affecting the quality of the fluids then materials or filtrators with less mass should be the most effective.

KEYWORDS

- ATP - Adenosine Triphosphate
- Material - Something in the filtration system
- Filtrator - What the filtration system is made out of
- ATP Measuring - A way of seeing how clean something is. Lower number means cleaner.



VARIABLES

Dependent Variables:
Amount of contaminants

Independent Variables:
Type of filtration materials and their order

Controlled Variables:
Dirtiness of the water that was filtered

PROCEDURE

1. Construct the filtration container
2. Cut the bottom off of a plastic bottle to make a funnel
3. Put a cotton ball inside the bottle and close it using a cap with pre-drilled holes
4. Turn the bottle upside down so that it can catch the water being filtered
5. Filter the samples
6. Pour the material into the bottle so that a layer is formed above the cotton ball
7. Pour water into the bottle and collect the water below in a cup
8. Repeat this for all combinations of materials except for the one with no filtrator
9. Measure ATP levels
10. Dip an ATP (Adenosine Triphosphate) strip into the water for 2 seconds
11. Data Analysis
12. Compare the color change on the ATP to the chart on the bottle
13. Turn the color results into numerical values using an algorithm
14. Sum up all the numbers to get the ATP for each filtered water sample; a lower number indicates cleaner water

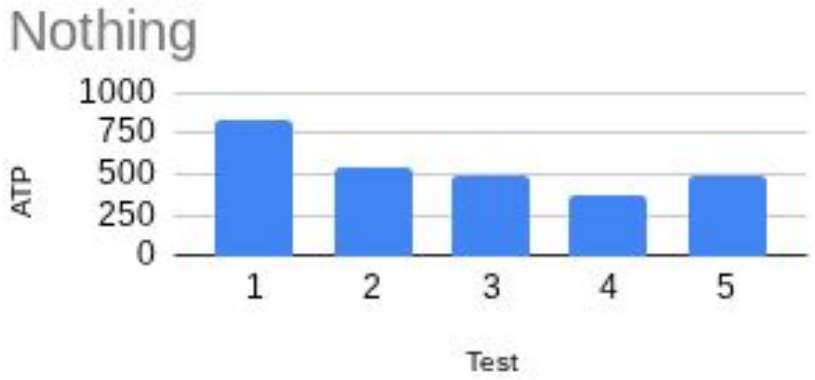
MATERIALS

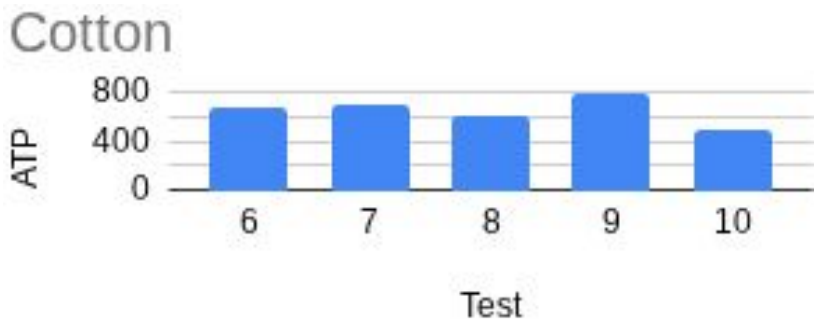
- 5 different filtration materials: Activated Charcoal, Ceramic Clay, Gravel, Sand, and Steel (iron filings)
- Plastic Gatorade bottle with a the bottom cut off (empty and cleaned)
- Cotton balls
- Dirty Water
- ATP Testing Strips
- 2 Plastic Containers
- 1 Large Cup
- Measuring Spoons

DATA

Overall, my project found that the most clean water comes from carbon being a material, and not using a filtration process at all. The reason for this is because of how easy it is for the dirt and grass to dissolve in the water, which is slightly more polluted. Overall, there was not anything tested that I would suggest to use for water filtration.

Filtrator	Material	Number
No Filtration	Nothing	1
No Filtration	Sand	2
No Filtration	Gravel	3
No Filtration	Carbon	4
No Filtration	Ceramic Clay	5
Cotton	Nothing	6
Cotton	Sand	7
Cotton	Gravel	8
Cotton	Carbon	9
Cotton	Ceramic Clay	10
Steel	Nothing	11
Steel	Sand	12
Steel	Gravel	13
Steel	Carbon	14
Steel	Ceramic Clay	15
Ceramic	Nothing	16
Ceramic	Sand	17
Ceramic	Gravel	18
Ceramic	Carbon	19
Ceramic	Ceramic Clay	20
Charcoal	Nothing	21
Charcoal	Sand	22
Charcoal	Gravel	23
Charcoal	Carbon	24
Charcoal	Ceramic Clay	25





RESULTS

Throughout the experiment, I got orange clay on my hands, so holding the ATP strip could have distorted some colors, since the colors are how you find out how clean something is. This could have tainted some results. Also, multiple shades on the testing strip color legend were very similar, so it was hard to classify how much of each contaminator there was.

CONCLUSION

My hypothesis overall predicted that the less complicated combinations for filtration would make the dirtiest water. While that was partially true, I did not expect that nothing I used would be the ideal material or filtrator. Throughout the experiment, I got orange clay on my hands, so holding the ATP strip could have distorted some colors, since the colors are how you find out how clean something is. This could have tainted some results. Also, multiple shades on the testing strip color legend were very similar, so it was hard to classify how much of each contaminator there was.

REFERENCES

The Borgen Project. Ceramic Filtration: A Possible Solution to Water Stress.

Science Buddies. From Contaminated to Clean: How Filtering Can Clean Water.