Different Filtering Water Methods

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Abstract

This project investigates basic, affordable methods for filtering water using common materials: chunk/powder charcoal, gravel, rocks, coarse sand, cotton and water bottles. The goal was to see if the chunk charcoal or powder charcoal worked the best. We built the filters by layering the cotton, charcoal, coarse sand, gravel, and finally rocks. We poured the water through the top and took data of how much time it took to filter and how clear it was before and after. The results showed the water much cleaner than before it just turned out yellowish because of the cotton. While this filtering didn't make the water really clear, I really think that if we would have used white cotton the water would have turned out clearer. The filtering process did remove most dirt and germs that the water before had. This way of filtering water is helpful when you don't have a lot of tools in front of you and you need water immediately. This project helped us learn easy ways to filter water when in need.

Keywords: Charcoal, filtering process, data, germs, methods

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Introduction

In our project we will be comparing 2 different methods of water filtration. They will both be the same procedure just that the charcoal will be powder and chunks. In this project we hope that we are able to find out which one is safer and faster in case of an emergency and we don't have clean water. With the rise of the water crisis we believed this was important because we never know if someday we will need to filter water because we don't have clean water. “Water pollution comes chemicals, fuels, garbage and plastic, fertilizers, and human waste that enter lakes, streams, and oceans through careless disposal or runoff.” (Lerner & Hackney, 2025) We need to be aware of the situation we are in right now. We hope to answer the question of powder or chunk charcoal, which one will work better and safer.

Methods

Our null hypothesis is filtering water with different methods (chunk charcoal, powder charcoal) will result in no difference in water cleanliness. Our alternative hypothesis is if water is filtered using different methods (chunk charcoal, powder charcoal), then if we need approximately 50 grams of charcoal, if we double the charcoal will it filter faster and result in cleaner water. Our independent variable is the size of charcoal- chunks or powder we will be using. Our dependent variable is how clean the water is after both methods are tested. Our controlled variables will be the amount of water we will be using, the same source where we will be getting our water, and the temperature of the water as well and the amount of time we give each method. We will give both methods the same amount of time to see which one works faster.

Materials

The materials used were four 500ml water bottles, powder charcoal, chunk charcoal, coarse sand, gravel, rocks, and cotton balls.

Procedures

This experiment was set up by first cutting the 4 water bottles in half, then following up we will turn the top half of the bottle around and add cotton balls where the lid is at. After that we will go head first at the powder/chunk charcoal, then the coarse sand, the gravel, and then finally the rocks at the top. When all of that is set up we will add the dirty water and observe how it goes down and cleans up.

Figure 1: The 2 bottles on the left have powder charcoal and the 2 on the right have chunks of charcoal.

Results

Our graph shows the 4 bottles we filter and the amount of time it took each of them.

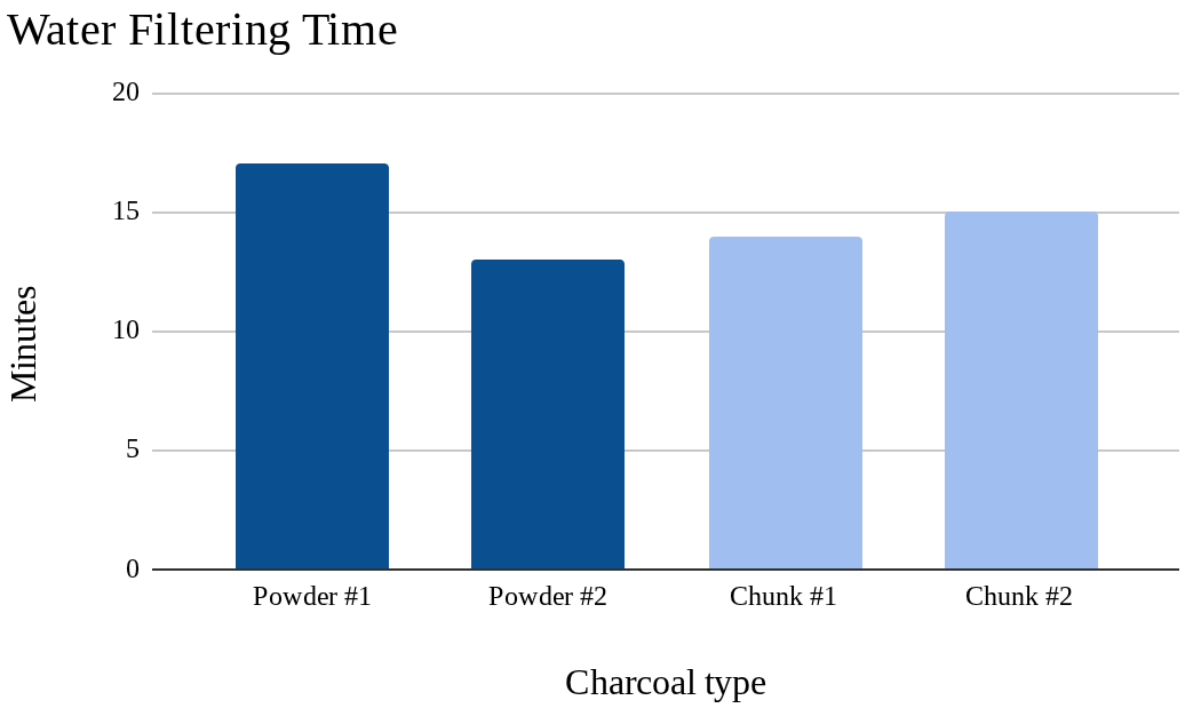

Figure 2: For bottle number 1 and 2 we used powder charcoal and it took a while to filter. Bottle number 3 and 4 chunk charcoal was used and it was a couple minutes faster.

Conclusion

The goal for this experiment was to figure out if the powder charcoal or chunk charcoal was fast at filtering which one was the fastest and the chunk charcoal seemed to be quicker by just a few minutes but the powder charcoal was apparently 25% clearer. Our hypothesis was supported by the results because we did figure out what type of charcoal was faster but the powder charcoal was a bit clearer. A limitation of this experiment was getting cotton. We were not able to get any on time so we used old cotton which caused the water to appear yellowish.

Discussion

Based on my findings, another experiment we could test is with different drinks and we can use the same procedure to observe if it cleans the drink as if it was water. “Liquid filtration occurs when a suspension of a solid in a liquid passes through a filter.” (Newton, 2021) In the future, experiments could be designed to help us figure out how to survive when in the need of water and you need something quick. This study has raised important questions about what is coming in our water supply. “The most common contaminants found in the public water supply are lead, nitrate, and radon—all of which pose substantial health threats.” (Blanchfield, 2023) This finding may be used for people to realize that not all the water they drink is safe to drink. It can cause troubles for some people, they have to be aware of the situation. “Filtration is carried out for one of two general purposes: in order to capture the solid material suspended in the fluid or in order to clarify the fluid in which the solid is suspended.” (Newton, 2021) Water filtration is an easy and fast way to help the community when it comes to drinking outside water that isn't clean. “In this population living with HIV/AIDS, a water filter combined with safe storage was used correctly and consistently, was highly effective in improving drinking water quality, and was protective against diarrhea.” (Peletz, 2012)

References

Boutilier, M. S. H., Lee, J., Chambers, V., Venkatesh, V., & Karnik, R. (2014). Water Filtration Using Plant Xylem. PLoS ONE, 9(2), e89934. http://dx.doi.org.lapr1.idm.oclc.org/10.1371/journal.pone.0089934

Drinking-water supply. (2011). In D. S. Blanchfield (Ed.), Environmental Encyclopedia. Gale. https://link-gale-com.lapr1.idm.oclc.org/apps/doc/CV2644150392/SCIC?u=azstatelibdev&sid=bookmark-SCIC&xid=c8717a24

Lerner, K. L., & Blackwell, A. H. (2025). Water pollution. In Gale Science Online Collection. Gale https://link-gale-com.lapr1.idm.oclc.org/apps/doc/VWZWUG337281882/SCIC?u=azstatelibdev&sid=bookmark-SCIC&xid=e2a42194

Newton, D. E. (2021). Filtration. In K. H. Nemeh & J. L. Longe (Eds.), The Gale Encyclopedia of Science (6th ed., Vol. 3, pp. 1769-1771). Gale. https://link-gale-com.lapr1.idm.oclc.org/apps/doc/CX8124400999/SCIC?u=azstatelibdev&sid=bookmark-SCIC&xid=d671180a

Peletz, R., Simunyama, M., Sarenje, K., Baisley, K., Filteau, S., Kelly, P., & Clasen, T. (2012). Assessing Water Filtration and Safe Storage in Households with Young Children of HIV-Positive Mothers: A Randomized, Controlled Trial in Zambia. PLoS ONE, 7(10), e46548. http://dx.doi.org.lapr1.idm.oclc.org/10.1371/journal.pone.0046548