

Title of Project: Purifying Adam's Ale (Water)

Hypothesis: If we make three water filters, then the second filter will work more efficiently because of the materials used and how they are layered.

Question: How everyday items can be used to make a water filter?

Variables

- Independent – The materials used inside the filter
- Dependent –How clean the water gets and the pH and TDS
- Controls – Water, water bottle, dirty water

Title:Homemade Water Filter Science Project

Website:<https://www.lovetoknow.com/parenting/kids/homemade-water-filter-science-project>

Citation: Michaud, K. (2023b, May 3). *Homemade Water Filter Science Project*.

LoveToKnow. <https://www.lovetoknow.com/parenting/kids/homemade-water-filter-science-project>

- Information found:
 1. Fact One - It is an easy way to filter water with the things around you.
 2. Fact Two - The natural soil of the ground filters leaves, insects, and other debris out of the water as part of the infiltration process.
 3. Fact Three - A homemade water filter is a simple activity that children will love
 4. Fact four - Unfortunately, due to pollution such as lawn care products, household chemicals, and fertilizers, groundwater can become contaminated and unsafe to drink.
 5. Fact five -Each layer of the homemade water filter has a purpose.
 6. Fact six -Gravel or small stones are used to filter out large sediments, like leaves or insects.
 7. Fact seven -Sand is used to remove fine impurities.
 8. Fact eight - The activated charcoal removes contaminants and impurities through chemical absorption.

9. Fact nine - It cannot clean everything but it makes the water clean enough to drink.
10. Fact ten - One of the most cost-effective ways to filter your water is through a water bottle filter.

Source 2

- Title: Make A Water Filter
- Website: [Student Project: Make a Water Filter | NASA/JPL Edu](#) NASA
- Citation: Student Project: Make a Water Filter | NASA/JPL Edu. (2020, May 22). *NASA/JPL Edu*. <https://www.jpl.nasa.gov/edu/learn/project/make-a-water-filter/>
- Information found:
 1. No matter how “clean” your filtered water looks, you should never drink it because it still may contain pollutants you can’t see.
 2. You can use water and dirt to simulate wastewater
 3. Instead of using rocks you can use seeds and rice.
 4. If you do it more than once the water will become cleaner.
 5. Don’t drink even if you see how clear it is.
 6. Always add something to help filter better.
 7. Do not drink the dirty or filtered water!
 8. Through the project the water is supposed to get cleaner.
 9. NASA engineers and scientists when they developed the water filtration system for the International Space Station orbiting Earth.
 10. You can almost use anything as a filter.

Source 3

- Title: The dirty water
- Website: https://www.teachengineering.org/activities/view/cub_envirion_lesson06_activity2
- Citation: *The Dirty Water Project: Design-Build-Test Your own water filters.* (2023, March 1). [Video]. TeachEngineering.org. https://www.teachengineering.org/activities/view/cub_envirion_lesson06_activity2

Information found:

1. Water naturally cleans itself with the ground and evaporates the water.
2. Some communities produce their own trash and waste .
3. When you work on teams, designing stuff is easier because you will get more ideas.
4. Water filter improves taste in water.
5. There are different water filters to choose from.
6. Boiling water is in an easy water filter.
7. Making water filters is easy to make and you also need a couple things .
8. Water filters are easy to maintain unlike other filters.
9. Filtering water is important because it has bacteria and you could get sick by the water.
10. Reverse osmosis is considered one of the most effective ways to use water filters.

Source 4

- Title: Make A Water Filter
- Website: [Student Project: Make a Water Filter | NASA/JPL Edu](https://www.nasa.gov/learn/project/make-a-water-filter/) NASA
- Citation: Student Project: Make a Water Filter | NASA/JPL Edu. (2020, May 22). *NASA/JPL Edu*. <https://www.jpl.nasa.gov/edu/learn/project/make-a-water-filter/>
- Information found:
 1. Seventy percent of the Earth is covered with water.
 2. About 3% of the world's water is drinkable.
 3. Dirty water can get cleaned.
 4. Don't drink any water after an experiment.
 5. Homemade water filters can teach people about the water cycle.
 6. Debris in water can kill you.

7. You can use natural materials to make a water filter.
8. Filtered water is still not safe to drink.
9. Homemade water filters can be a fun project for kids.
10. Water is not always drinkable.

Purpose of the Experiment: The purpose of this experiment was to test different materials in a water filter. The scenario was that if we were stranded in the desert and found water. We would have to create a water filter to filter it because it was dirty.

Bottle 1

- Activated Charcoal
- Cloth
- Fine Sand
- Grain
- Beans
- Paver Sand
- Rocks
- Color Rocks

Bottle 2

- Beans
- Coffee Filter
- Grain
- Fine Sand
- Paver Sand
- Cloth
- Rocks
- Color Rocks
- Cotton

Bottle 3

- Cloth
- Beans
- Grain
- Coffee Filters
- Paver Sand
- Fine Sand
- Small Rocks

- Colorful Rocks

Bottle 1.

1. To build your own filtration system, you'll need a filter cartridge.
2. Start by carefully cutting your water bottle.
3. Remove the cap from the bottle. Put a coffee filter over the opening and secure it with a rubber band.
4. First put sand at the bottom
5. Then activated charcoal.
6. Then more sand.
7. Then finish with rocks on top.
8. Then put the dirty water in another bottle and pour in the filter.

Bottle 2

1. First you get your materials.
2. Next you get your bottle and cut the top(don't cut although of the bottle).
3. take a pantyhose and put it on the bottom.
4. Then put one cotton ball.
5. Then put your fine sand in after.
6. Then put rice/grain in your bottle.
7. Then put sand.
8. Then lots of rocks.
9. Then put in your beans.
10. Lasly put more rocks on the top(could be colorful or not).

Bottle 3:

1. Get all the materials.
2. Cut the top of the bottle.
3. Add cloth.

4. Put a coffee filter.
5. Add fine sand.
6. Put a coffee filter.
7. Add some rice (grain).
8. Add another coffee filter.
9. Put in beans.
10. Add another coffee filter.
11. Add Paver sand.
12. Put a coffee filter.
13. Add rocks.
14. Put in one last coffee filter.
15. Lastly add colorful rocks.

TRIAL 1: Filter 1,2,and3

DATE: January 12, 2024

Time: 19 min to do all of our trials

Beginning: 11:16

Ending: 11:35

Variables:

- Independent – The materials used inside the filter
- Dependent – How clean the water gets
- Controls – Water, water bottle, dirty water

Results of Trial 1 experiment

The results of this trial are the TDS for filter one and two were 6075 the results for trial three were 5647. For the conductivity all were greater than 10,000.

Observations/ thoughts from our experiment:

During this filter our group was concerned and we were all disappointed. This water filter made our water still come out brown.

Our expectation was that we thought our first water filter would not work, so our group began to get concerned when purifying the water because it was brown. In the end we were able to get the pH higher and we lowered the TDS levels. Our group's hypothesis was incorrect in this case because we thought this water filter would do worse.

TRIAL 2: Filter 1,2,and3

DATE:January 12,2024

Time: 18 min to do all of our trials

Beginning: 11:20

Ending:11:38

Variables:

- Independent – The materials used inside the filter
- Dependent –How clean the water gets
- Controls – Water, water bottle, dirty water

Results of Trial 2 experiment were:

Our results were really bad for the first filter because the water had salt,dirt,and more in the water.The second filter looked pretty clean but had salt in the bottom.The third filter looked just foggy and also had salt on the bottom.

Observations/ thoughts from our experiment :

We thought our experiment was good but we thought that the water wouldn't be good by the look of it and everything in the bottle was kind of mixed up.The pH levels were 4.3 for filter one then for filter2 the pH level was 4.1 for filter three our pH levels didn't go much lower but it was 4.0.. We didn't have high hopes for filter one, but we had good hopes for the other two.

Our expectation was that :We thought our second trial wasn't going to work out because the first trial the water looked brown and gross.We also thought filter 1 had mold and algae in it. We didn't think the pH levels and ppm levels would be what they turned out to be.

TRIAL 3: Filter 1, 2, and 3

DATE: January 16, 2024

Time: 30 min to do all of our trials

Beginning: 11:02

Ending: 11:32

Variables:

- Independent – The materials used inside the filter
- Dependent – How clean the water gets
- Controls – Water, water bottle, dirty water

Results of Trial 3 experiment were:

The results were the first filter water looked brown and yellow and looked really gross. The second filter water looks clear but foggy and kind of looks like lemonade. The third filter also looks clear but foggy but it looks the cleanest. Out of all the first filter looks the dirtiest.

Observations/ thoughts from our experiment : That filter 1 water looks like tea, filter 2 water looks like lemonade, and filter 3 water looks like salt water.

Our expectation was that ... That filter 2 would make clean water and that filter 1 would make disgusting undrinkable water. Also that filter 3 would work better than filter 2.

Our Data Chart

	Trial 1	Trial 2	Trial 3	
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	pH	$\mu\text{S/cm}$ (conductivity)	ppm (TDS)	pH	$\mu\text{S/cm}$ (conductivity)	ppm (TDS)	pH	$\mu\text{S/cm}$ (conductivity)	ppm (TDS)
Filter 1	4.5	>10,000	6075	4.3	>10,000	6153	4.1	>10,000	6253
Filter 2	4.3	>10,000	6075	4.1	>10,000	6315	4.1	>10,000	6857
Filter 3	4	>10,000	5647	4.1	>10,000	6233	4	>10,000	6153
		Unfiltered Water level							
	ph	$\mu\text{S/cm}$ (conductivity)	ppm (TDS)						
	4	5302	4732						

Closing: In this project we learned how to make a water filter with easily accessible items. We worked together to create three filters with varying techniques. Our lowest pH level is 4 and our highest was 4.5. A neutral pH is 7. Our lowest TDS level is 5647 and our highest is 6315. Our hypothesis ended up being incorrect and filter three ended up looking gross but actually being the most clean. We realized that even though the water looks one way it can be totally different. It was able to give us all a different perspective. Our group is hopeful that newly implemented water filters will continue to help people around the world.

Reflection: After looking at the results of our project our group was pleasantly surprised with some results. Filter one we thought would be the worst, but actually ended up being one of our best filters. Filter two and three ended up having a similar pH but being pretty different, we hoped our pH would be more

neutral but for our water filters our pH was between 4-4.5 TDS. Our group is proud of our turn out and we all put in our best effort.

Our Project's Importance to the World (real world application):

This project is so important and applies to the real world. It gives us a glimpse of what water can look like in places deprived of clean water. It helps us to understand how water filters are made and engineered and gives us a glimpse of the effort put in to clean water. This helps us appreciate and be more grateful for the clean water we have. As our group we hope people will continue to get access to clean water.