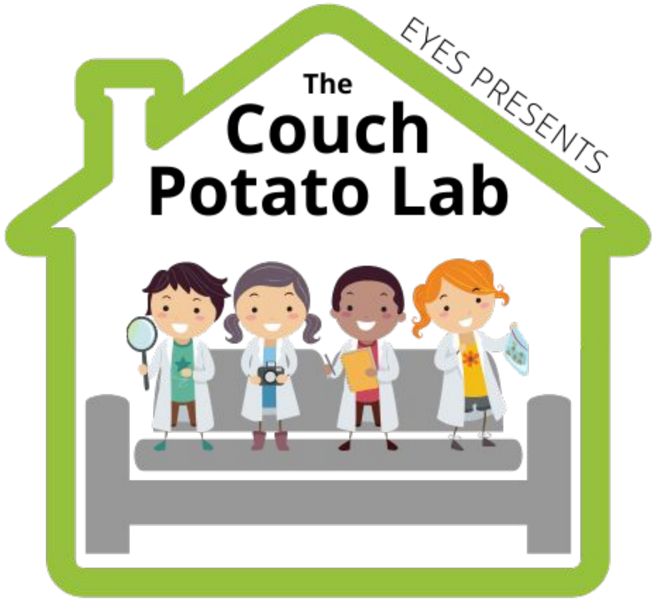

Super Sweet Slow Sand Filter

Microbiology and Engineering

Episode 48

eyes
EDUCATING YOUTH IN ENGINEERING & SCIENCE

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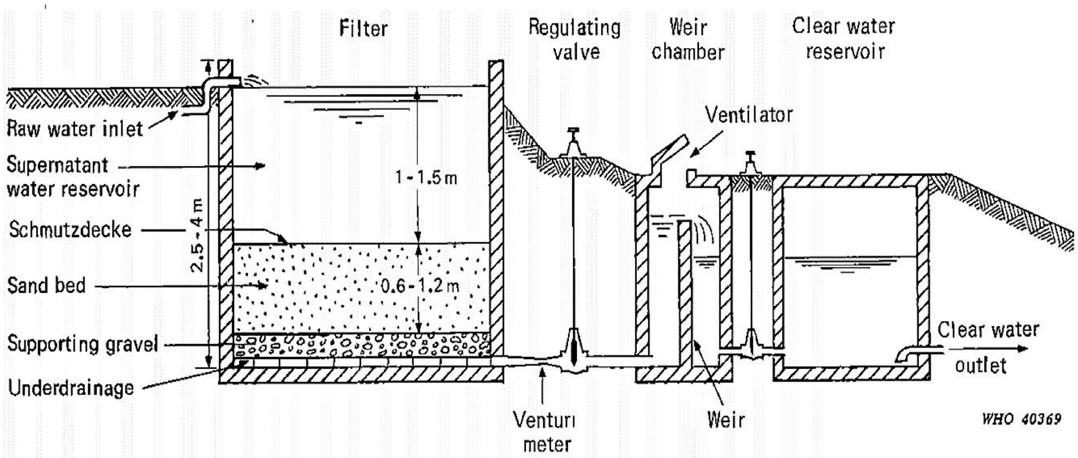
THE COUCH POTATO LAB: Super Sweet Slow Sand Filter

Clean drinking water is a very important part to staying healthy and free from disease. While places like Saskatchewan have modern water filtration technology, the old-school method of **slow sand filtration** will do the trick too!

The name **slow sand filtration** [1] explains all there is to this machine: sand is used as to filter out water **pathogens** (bacteria that make us sick), and this process takes a long time. The sand at the top of the filter is biologically active [2] (called a ***schmutzdecke***) meaning things like other bacteria, fungi, and algae from the water sample are there. These microbes grow in that top layer and feed on the pathogens.

With the pathogens destroyed, the sand filters the water of their parts and any other impurities like weeds, grass and sticks. The filter works best at warm temperatures, since this filter contains living things. Finally, it's best that a layer of pebbles, gravel or other larger rocks bigger than sand are placed at the bottom to hold the sand up, preventing the sand from getting into the filtered water.

In this activity, we will be building our own filtration system to test to see if we can filter pond water; however WE WILL NOT BE DRINKING THE WATER BECAUSE WE DO NOT KNOW WHAT IS IN IT**.** The materials you need are a simple empty water bottle, sand, and gravel.



Curriculum Connection(s):

ES20-HP1

ES20-AS2

DL6.5

LS2.2

Materials:

- 2L, 750mL or 500mL plastic bottle
- Scissors
- Sand
- Plastic straw
- Pebbles or gravel
- Pond, lake, or puddle water

STEM at Supper:

Filtration is one way we get rid of pathogens. Can you think of any other ways to get rid of them?

What are other examples of filtration in everyday life? What is the purpose of filtration?

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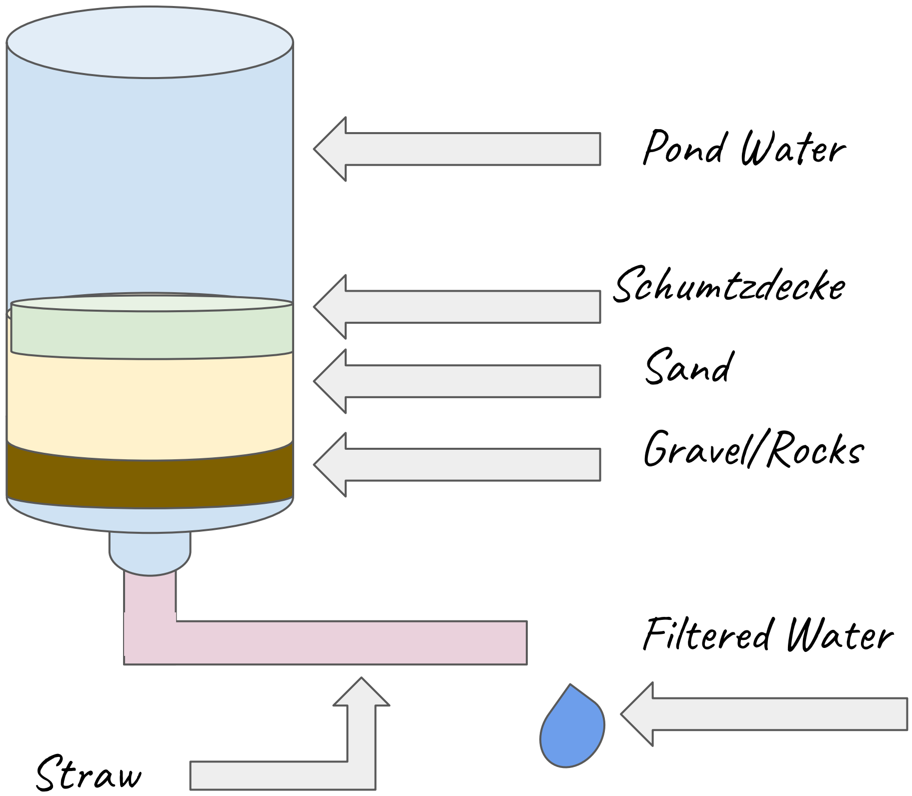
1. Go to your local park and look for puddles, streams, or lakewater, and get about ¾ of your bottle size worth of water. Do this with an adult so we can all stay safe!

2. Cut off the bottom of the plastic bottle with scissors (about half an inch). Make sure the lid is still on.

3. Poke a hole in the lid of the bottle cap and squeeze the straw through.

4. Fill the filter with gravel/pebbles/small rocks first, about two inches for smaller bottles (750mL and 500mL) or four inches for the 2L bottle. This is the supporting layer for the sand.



5. Add about a cup and a half of sand if using the smaller bottles. If using a large one, add about three to four cups. The combined layers of gravel and sand should be about halfway filling the apparatus.

6. Add your water. Make sure the filter is standing upright so that the water goes down due to gravity. Have a cup to catch the water coming out from the straw. What do you notice about the colour of the water? Is it clearer? The same? Dirtier?

REMEMBER: DO NOT DRINK THIS WATER

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Let's explore: What do you think would happen if we used more diverse rock sources (for example, using sand, soil, and then a support layer of large rocks)? Would the water still be considered "filtered"?

Use your filter with water that has food colouring in it. Predict what would happen: would the water come out clear or still coloured? Explain what you think happened afterword.

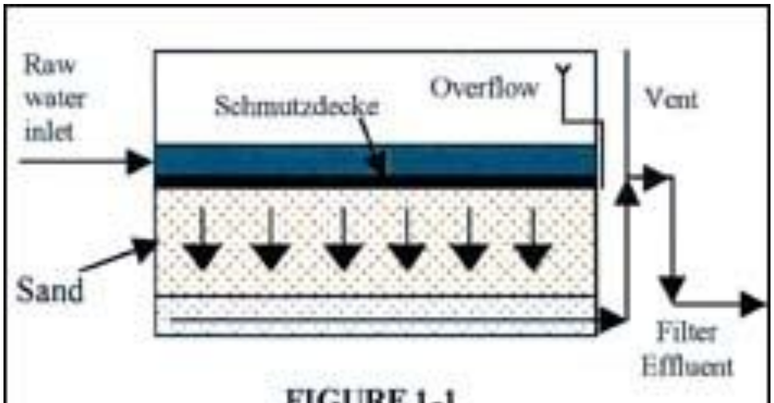

FIGURE 1-1
CONVENTIONAL SLOW SAND FILTER

STEM Spotlight

Alice Hamilton was one of the first female epidemiologists, known for the creation of occupational epidemiology (the study of health conditions of workers in industry, hospitals, and engineering). Her work focuses on how potential work conditions such as radiation, exposure to chemicals, noise and many others affect workers.

She led a nationwide study and survey on the dangers of metal smelting and mining, which led to new laws on worker health safety to be implemented. Thanks to her work, many jobs that were infamously dangerous had safety regulations, and therefore saved many lives.

Dr. Hamilton was appointed as one of the first female faculty members at Harvard University, and despite constantly being close to dangerous chemicals and conditions, lived to be 101 years old!