

Purifying Water Laboratory:

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Teacher's Guide

Goals

- To learn about the process of water purification
- To relate chemistry to everyday experience

The Laboratory

In this laboratory, students learn to purify water using common separation techniques. They start out with a mixture of oil and water containing other ingredients, and they end up separating the components. Thus they learn about the importance of water purification, and about the way it is done.

Materials for Each Group

- 2 funnels with three pieces of filter paper
- A stand with ring holder
- Rubber tubing
- Four 250 ml beakers
- Two 100 ml beakers
- A 2-liter bottle filled with: tea, coffee, garlic, some old cafeteria grease, salad dressing, etc.
- Containers with sand, rubble, and activated charcoal
- A styrofoam cup
- An iron nail

SAFETY

Wear safety goggles at all times.

Activated charcoal is relatively safe for handling.

Lecture Notes

We have just finished reading the article about Riverwood, and we have to find out what happened to the fish? Why are the fish dying?

This is exactly what people do in a situation like this. They have a team of people to go in and take a sample of the water. To check it they do different processes, they check out exactly what contaminant is in there, and after this they do a purification processes.

That's what leads us to our experiment today. I got a sample from Riverwood's foul water. We are going to go through the water purification processes that we've talked about.

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Instructions

The first one is going to be the oil separation, where we separate the oil from the other mixture. Then, we will do the sand filtration and the last one will be the charcoal absorption, and that final product should give you a clear solution.

Please keep your goggles on.

Make sure that you record the volume before you begin.

Make sure that you measure the volume after each process, because it is important for your end result.

After you finish the oil separation, make sure that you read the instructions for the sand/rubble filter.

Teaching Tips From Ms. Baptiste

The first unit in ChemCom is about exploring water, and it is introduced with an article about a fictional town, Riverwood, that had water contamination. We built around that, we talk about direct and indirect uses of water. It helps relate chemistry to things that you see every day.

We do an experiment that shows us how, when water is contaminated, people go in and go through these processes—they filter out the contaminants. The classes go in as a cleanup crew, and try to purify this water sample.

We use three steps; oil water separation was the first. The oil floats on top and they decant the oil off and take the bottom layer.

Too much chemistry in the beginning is discouraging for the students. Science is very discouraging for the students, as a whole. They are very intimidated by it.

So if you can introduce it to them, have them do chemistry, without even knowing that they are doing chemistry, it is a great way to bring them in.

Once you have them, you can say, look—you did chemistry, and this is what you did, and from there, you can write the chemical components of it and exactly the scientific terms.

We did the charcoal absorption filtration and this was where the kids were really intrigued, because the charcoal absorbed the rest of the contaminants, and the kids realized that they were actually doing chemistry.

The foul water was an excellent experiment to do, because we started out with a really dark, cloudy, oily solution, and we ended up with clear water, and the kids were amazed that we could do something like this in chemistry lab.

This really grabbed their attention, and when you grab their attention they are willing to learn more, so I thought this was a great introduction, as far as a lab goes.

References: Links

<http://www.epa.gov/OGWDW/kids/filter.html>

A procedure for water filtration.

References: Readings

Oughton, J., Xu, S., and Battino, R. (2001) "The Purification of Water by Freeze-Thaw or Zone Melting," *Journal of Chemical Education*, Vol. 78, No. 10, pp: 1373-1374.