Lab Tour Lesson Plan

Middle School and High School

“Filtration Process”

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**Objective:** To show students the different reasons for water treatment and different technologies for filtration. The goal for the lab is for students to have experience with filtering and to learn about water treatment.

**Vocabulary:**

Activated Carbon-charcoal that has been heated or otherwise treated to increase its adsorptive power

Adsorption- selective accumulation of a substance at the interface between two phases

Filter- a porous device for removing impurities or solid particles from a liquid or gas passed through it

**Standards Met:**

HS-LS207: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity

**Materials Needed:**

Food Coloring

Water Bottle Water Filter (I used a Bobble brand so I don’t know how others would work)- this is acting as the Activated Carbon so you can also use that if it is readily available.

Dirt

Water

Two Bottles (I used Gatorade bottles)

Tupperware (to contain the mess)

Multiple Sized Filters

 For this I used a window screen and a cut up t-shirt. Anything will work as long as the filters are two different sizes.

**Introducing the Lesson:**

I have always begun the lesson by discussing what an environmental engineer is and the types of projects that they work on. I also spend time asking the students why they think environmental engineering is important and what would happen if we didn’t have someone around to clean up water and trash.

**Engage:**

To get students engaged have them figure out the best way to filter out the dirt and food coloring. You can either walk through the whole experiment with the class or let them loose and see who has the cleanest water when finished. (I have done either and typically walking the students through it will work best for a short time frame while letting the students try their own ideas is good for a longer period)

**Further Investigation:**

You can discuss with the students what other types of filtration there is available to use. I sometimes focus on water treatment and how the filters that we used today do not have the ability to filter out particles that the human eye can’t see such as viruses. The students at this point could look into additional types of filtration such as Reverse Osmosis that has the ability to remove nano particles from the water.

**Questions That Students Should Be Able To Answer:**

What is activated carbon and how does it work?

Why do filters have to be in a certain order and why can’t you just use the smallest size filter for everything?

**Procedure:**

 1. Begin by having the students combine about 2 spoonful’s of dirt and one drop of food coloring in the bottle that is filled with water.

 2. Have the students filter the water starting with the largest filter size.

 3. Filter now with the t-shirt or smallest filter size.

 \*\* You want to do the larger filter first to help prevent clogging of the second filter and loss of water.

 4. Run the water (should have few dirt particles in it) through the water bottle filter.

 \*\*This won’t filter out all of the color but it will remove a noticeable difference.

 5. Compare the final product with the dirty colored water that it started with.