

Name: _____ Period: ____ Date: _____

Environmental Science

#8-7: Water Purification Lab

Introduction

In the Midwest, most of the water we use in our homes comes from underground aquifers, but in many large cities, water is drawn from rivers and lakes. Water from these natural sources can contain soil, toxic substances, harmful bacteria and other impurities that must be removed before we can drink it. When water is treated for drinking, it is first allowed to settle in giant tanks to allow large particles to fall to the bottom. The water is then treated to remove other suspended matter to produce clear water. In this lab activity, we will chemically process a local water source to produce clear water. We would then need additional treatment of the clear water to make it potable, or safe for drinking.

Purpose

To compare chemical methods of purifying water using a local source.

Prediction

Do you think you'll be able to completely purify your water sample in this lab? Why or why not?

Equipment

250-mL beakers (3)
500-mL beaker (1)
measuring spoon
plastic funnel

stirring rod
Vernier Conductivity probe
Vernier LabQuest
Vernier Turbidity sensor

Materials

calcium oxide (lime) [CaO]
filter paper
local water sample

pH paper
potassium aluminum sulfate (alum) [KAl(SO₄)₂]

Procedure

1. Fill a 500-mL beaker with about 450 mL of surface water from a local source (stream, lake, etc.).
2. Label the 250-mL beakers as follows: “#1 - Control”, “#2 - Filtered”, and “#3 - Treated”
3. Pour about 150 mL of your water sample into the “control” beaker (#1). Set it aside so it can be compared to our results later.
4. Using the filter paper and funnel, carefully pour about 150 mL of your water sample through the funnel into the “filtered” beaker (#2).
5. To prepare your chemically treated water sample:
 - a. Add a small, match-head size amount of solid lime to the remaining sample in the 500-mL beaker and stir thoroughly.
 - b. Using a strip of pH paper, test the alkalinity of the sample. If the paper does not turn blue, continue to repeat the previous step and test with pH paper until it turns blue.
 - c. Add ½-teaspoon of alum to your water sample and stir thoroughly. Continue to add alum to the water until a thick, white, gelatinous solid forms. Allow the solid to settle to the bottom.
 - d. Filter your water sample through a new piece of filter paper into the “treated” beaker (#3).
6. Using a Vernier LabQuest, test the conductivity and turbidity of all three of your samples. Be sure to rinse your probes in between tests to avoid cross contamination.

7. Dispose of all solutions in the sink and rinse all equipment with tap water. Dispose of used filter paper and pH paper in the trash can.

Data

Beaker	Observations (color, odor, etc.)	Turbidity	Conductivity
1. control			
2. filtered			
3. chemically treated & filtered			

Questions & Conclusions

1. Was your prediction correct? Why do you think this was the case?
2. How do the appearance and odor of the filtered water sample compare with the untreated control sample?
3. How do the appearance and odor of the chemically treated water sample compare with the untreated control sample?
4. Did the conductivity or turbidity change between the control, filtered and treated water? Why do you think this happened?
5. Do you think the untreated water sample is safe to drink? Why or why not?
6. Do you think the chemically treated water sample is safe to drink? Why or why not?
7. Why do you think it was necessary to make the water sample basic, or alkaline, by adding lime?
8. Do you think this is a practical method for purifying water? Why or why not?