

Chemistry Discrepant Water Activities **Teacher Resource**



Background Information

These simple water activities investigate water treatment plants and how the public gets clean drinking water. In the first activity, students will learn the process of adding certain chemicals to the water to make it acidic to clean the water then add chemicals to make it basic to prevent making holes in the underground pipes. The second activity investigates water treatment further experiencing the chemical that makes dirt particles sink to the bottom and out of the water.

Before each activity, have the students state a hypothesis.

MATERIALS

Document Camera	Timer
Personal Computer	Graduated Cylinder
Interactive White Board	3 Small Beakers
Safety Goggles	Red Cabbage Leaves
Sandwich Size Plastic Bag	Water
Plastic Cups	Laundry Detergent
Small Opaque Plastic Cups	Vinegar
Scrap Paper	Scissors
Pencil	3 Eye Droppers
Metric Ruler	Alum (spice)
String	2-empty clear tennis ball containers
Pushpins	Tablespoon
Masking Tape	Dirt

PROCEDURE

Activity 1 *pH of Water*

To make the laundry detergent solution, add 1 teaspoon of laundry detergent to 1 tablespoon water. Place 1 tablespoon of the liquid into its labeled cup.

1. Wear safety glasses through entire experiment.
2. Label each plastic cup accordingly:
 - a. #1 Control
 - b. #2 Vinegar
 - c. #3 Tap Water
 - d. #4 Laundry Detergent
 - e. #5 Laundry Detergent-Vinegar
3. Cut 2 red cabbage leaves into small pieces and place them in a plastic sandwich bag.
4. Add about a $\frac{1}{2}$ cup of warm tap water and let the air out of the bag and close.
5. Mash the leaves until the water turns dark blue (indicator solution).
6. Pour the indicator solution into a graduated cylinder.
7. Measure how much indicator solution there is and divide that number by 5.
8. Pour the indicator solution evenly into the 5 plastic cups.
9. Add three drops of each solution according to the labeled plastic cups:
 - a. #1 Add nothing
 - b. #2 Add Vinegar
 - c. #3 Add Tap Water
 - d. #4 Add Laundry Detergent
 - e. #5 Add Vinegar 1st, swirl, then add Laundry Detergent and swirl. Try to get the solution to return to blue or neutral again.
10. For each cup, after adding the solution, swirl gently and observe if there is any change in color.
 - a. Change to Pink→Acid
 - b. Change to Greenish-Blue→Basic
 - c. Stays Blue→Neutral

QUESTIONS *Activity 1*

1. What is the indicator solution and why do we use it in the lab?
2. Which products used are acidic? basic? neutral?
3. Investigate how clean your city's water source is and where does it rank on the cleanest water in America.

Activity 2 *Clean Water*

1. Poke a hole in the bottom of the opaque cup with the pushpin.
2. Make the hole big enough in order to thread a string through it.
3. Cut along the small edge of the cup to make a disc.
4. Take a marker and divide the cup bottom into four equal wedges.
5. Fill in two opposite wedges with color.
6. Thread the string through the cup and tie a knot at the end.
7. Stack 5 pennies on top of the knot in the center of the disk.
8. Tape them down securely.
9. Now you have a Secchi disk which is a special tester to see how clear the water becomes.
10. Label the tennis ball containers:
 - a. #1 Control
 - b. #2 Alum
11. Fill each container with water; leave 4cm open from the top.
12. Add 4 tablespoons of dirt to each container and mix well.
13. Add 1/4tsp of alum to each container and stir.
14. In container #2 Alum, slowly lower the Secchi disk until you cannot see it anymore.
15. Hold it steady and have your partner measure the depth of the disk. Record data.
16. Repeat steps 14-15, for container #1.
17. Start the timer for 10 minutes, then repeat steps 14-15
 - a. Do this 3 times and record data in a table.
18. Let the containers settle overnight and check the next day.

QUESTIONS ***Activity 2***

1. What do you notice about the depth of the disk in each container?
2. What is significant about this difference in depth?
3. Why and how can using a Secchi disk give you better information than just looking at the two water samples with your own eyes?