

“Rainfall to Tap”

Lesson #2 - Tap into Goodness



Introduction:

Students will learn the major differences between tap water and bottled water, how to test for minerals and chlorine in drinking water, why chlorine is used, and how you can neutralize it.

Concept:

Bottled water does not necessarily taste better than tap water.

Actions:

Perform a blind taste test.

(Don't let the students know the contents of the containers!)

- A. Fill up container “A” with bottled water.
- B. Fill up container “B” with distilled water.
- C. Fill up container “C” with tap water from the school.
- D. Have students raise their hands to show their prediction of what they think they will like the most. (Bottled, Distilled, Tap)
- E. Allow students to come up and sample each type, discarding the cups before returning to their desks.
- F. Students then circle their favorite on the data sheet.
- G. The classes’ preference is then revealed by a show of hands.
 - a. “A” Bottled Water = We don’t know what’s in it?
 - b. “B” Distilled Water = No minerals/Flat
 - c. “C” School Tap Water = Contains minerals and chlorine

Concept:

Bottled water is not better for you than tap water.

Actions:

- A. Display “Tap water fact sheet”.

Concepts:

Tap water can contain natural bacteria, minerals and chlorine.

Actions:

- A. Display "Conceptual Hydrologic Cycles for Kitsap County".
 - a. Water Cycle
 - b. Infiltration
 - c. Aquifer materials, and how they got there?
- B. Have you ever noticed red or brown staining in your toilet or bathtub?
 - a. We flush water mains to remove Iron (Fe) & Manganese (Mn).
 - b. MCL for Fe = 0.3 mg/L, Mn = 0.05 mg/L
 - c. Explain mg/L & ppm
- C. Divide class into groups of 3.

(Remind them not to drink the water)
- D. Pass out 1 test kit to each group and instruct students to unpack them.
- E. Using the 100 ml coli form sample bottles provided, (#1 concentrated Iron, #2 distilled, #3 tap) students measure out 25 mL of water into each corresponding graduated cylinder using the funnel provided.
- F. Have students predict which samples contain Iron and record on the data sheet.
- G. Students use the scissors provided to open each Iron reagent packet and add one to each cylinder and swirl gently to mix.
- H. Students record color changes and concentrations on their data sheets.
- I. Using a professional colorimeter, the presenter measures the amount of Iron in the schools tap water.
- J. Were their predictions correct? Why or why not?
- K. Have students record the conclusion on the data sheets.
- L. The MCL for Iron is 0.3 mg/L. Is the schools tap water below this?
- M. Clean up & Pick up kits.

Concepts:

Chlorine (CL2) serves a great purpose and can be neutralized.

Actions:

- A. Today chlorine is used when installing new infrastructure, repairing broken pipes and to prevent the growth of "coli form" bacteria.
 - a. Coli form bacteria are easy and inexpensive to sample for, and their presence is used to indicate that other pathogenic organisms of fecal origin may be present.
- B. The presenter adds 1 drop of 8.25% Clorox "concentrate" to 1 gallon of distilled water in front of the class and explains what "dose" we expect to see. (About 1 mg/L or ppm)
- C. Using a professional colorimeter, the presenter measures the amount of Total CL2 in the distilled water and explains mg/L and ppm.
- D. Does anyone have water at home that stinks like "rotten eggs"?
 - a. It's the oldest living organism dating back 3.5 billion years. It eats sulfate and expels sulfide, producing the bad smell know as Hydrogen Sulfide (H2S).
 - b. Try refrigerating your water at home to remove the smell of H2S and add lemons to neutralize the chlorine!
- E. Squeeze 1 lemon wedge into the water that tested positive for CL2.
 - a. Water purveyors are required to neutralize highly chlorinated water before dumping it on the ground during flushing or other routine maintenance activities to protect the environment.
- F. Next, the presenter measures the amount of chlorine in the schools tap water and the students record the results.
 - a. The MCL for chlorine is 4.0 mg/L. Is the schools tap water below this?

Concept:

The Earth is a natural filter that.

Actions:

- A. Display "Conceptual Hydrologic Cycles for Kitsap County".
- B. Explain that the earth's materials help to clean our drinking water naturally.
- C. The confined aquifer is additionally protected from contaminants due to the confining layer.
- D. The Kitsap PUD tests for hundreds of contaminants on a regular basis and reports the findings to customers annually.
- E. To help you can make sure that anything you put on the ground or down the drain is safe to drink!