An Investigation of pH, Salinity, and Dissolved Oxygen Among Water Communities

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Abstract

Water content varies from community to community throughout the world. Some of these are natural accuracies caused by nature and some are induced by human. The research team compared the water quality results against local surrounding counties, statewide, countrywide and International water quality standards. In order to illustrate these differences the 2007 Topics in Computer Science course, the Hydrology Research team compared water samples from the Pasquotank River located in Elizabeth City North Carolina, Lake Cavalier which is located in Portsmouth Virginia, Playa De Mar Beach Spain, Chesapeake Bay Virginia and samples of tap water. The team measured Ph, Salinity, and Dissolved Oxygen. The team will completed literature reviews for each test site.

I. **Overview**

The Fall 2007 Hydrology Research Team project was to compare water samples from the Pasquotank River (Elizabeth City North Carolina), Lake Cavalier (Portsmouth Virginia), Playa De Mar Beach (Spain) and, The Chesapeake Bay (Virginia) too samples taken from their tap water at home. The research activities proved without a doubt that water content varies depending on the samples original location and, the stimuli within said locations. The team examined records and, archives on each location to determine if any stimulus might affect the water samples altering the results.

II. **Data Collection**

The team tested each of the water samples for their pH, Salinity and, Dissolved Oxygen levels. These tests were performed three times per sample within the first day of the team's meeting.

III. **Background Information**

IV. **Results**

The salinity test helps us determine factors that may effect the environment. If there is a large variation in the salinity content in a short period of time, it can determine that there is something in the surrounding community. An example of such an occurrence would be a depletion of ground water allowing water with a higher salinity content to move into its place. We've determined that the salinity content is at an appropriate level.

The pH test results tell us the acidity level of the samples. The pH is important because if

the acidity level is not neutral enough not only is not safe for us to consume, it is uninhabitable for organisms living with in the water. Our data shows that our water is close enough to 7.0 to consider it neutral.

The Dissolved Oxygen Test, Oxygen is naturally dissolved in water and is stored there until it is used by the organisms living in the water. With that being said the dissolved oxygen levels are sufficient in all locations except in Viking Village where the dissolved oxygen level are abnormally low.

V.**METHODOLOGY**

The methods used to develop this document successfully are as followed:

A. LaMotte Salinity Test

Step One: Fill test tube to 10mL indicator with dematerialized water from the dematerializing bottle.

Step Two: Fill the 0~1.0 direct reading titrator to 0 the line with sample water. Wipe any excess water off the titrator.

Step Three: Dispense 0.5mL of sample water into titration tube by depressing plunger until tip is at the 0.5 line. Discard remaining water in titrator.

Step Four: Add three drops of *salinity indicator reagent A. Cap and gently swirl to mix. Solution will turn yellow.

Step Five: Fill the 0~20 direct reading titrator with *salinity titration reagent B. Insert titrator into hole of cap.

Step Six: While gently swirling sample, slowly depress the plunger until color changes from yellow to pink brown. Read test result where the large ring on the titrator meets the titrator barrel. Record as ppt Salinity

Step Seven: If titrator becomes empty before color change occurs, refill and continue titrating. Add original amount (20ppm) to final result.

B. LaMotte Dissolved Oxygen

Step One: Fill water sampling bottle.

Step Two: Add 8 drops of *Manganous Sulfate Solution.

Step Three: Add 8 drops of *Alkaline Potassium Iodide Azide.

Step Four: Cap and mix.

Step Five: Allow precipitate to settle.

Step Six: Add 8 drops of Sulfuric Acid, 1:1.

Step Seven: Cap and mix until reagent and precipitate dissolve.

Step Eight: Fill test tube to the 20mL line with fixed solution.

Step Nine: Fill titrator with *Sodium Thiosulfate, 0.025N.

Step Ten: Titrator until sample color is pale yellow. (If the sample already resembles a pale yellow, skip to step 11)

Step Eleven: Add 8 drops to starch indicator, the sample should turn blue.

Step Twelve: Continue titration until blue color just disappears and solution is colorless.

Step Thirteen: Read result in ppm Dissolved Oxygen.

C. Oakton pH

Remove cap from electrode Switch until on (ON/OFF).

Dip the electrode into the test solution Stir once and let the reading stabilize.

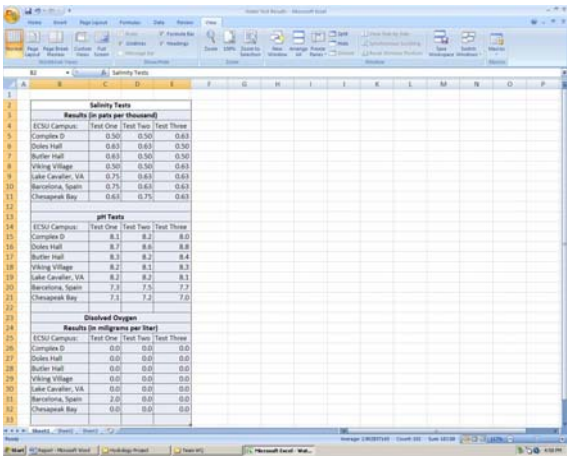
Caution: Never immerse the electrode above color band! This will damage instrument electronics!

Note the pH or press HOLD/CON button to freeze the reading. Press HOLD/CON again to release the reading.

1. Press ON/OFF to turn off tester. If you do not press a button for 8.5 minutes the tester will automatically shut off to conserve batteries.

D. Excel

Start Menu> programs> Microsoft Office> Microsoft Excel



Salinity Tests			
Results (in parts per thousand, ppt):			
	Test One	Test Two	Test Three
ECSU Campus:			
Complex D	0.50	0.50	0.63
Doles Hall	0.63	0.63	0.50
Butler Hall	0.63	0.50	0.50
Viking Village	0.50	0.50	0.63
Lake Cavalier, VA	0.75	0.63	0.63
Chesapeake Bay, VA	0.63	0.75	0.63
Playa De Mar Beach, Spain	0.75	0.63	0.63

pH Tests			
Results:			
	Test One	Test Two	Test Three
ECSUCampus:			
Complex D	8.1	8.2	8.0
Doles Hall	8.7	8.6	8.8
Butler Hall	8.3	8.2	8.4
Viking Village	8.2	8.1	8.3
Lake Cavalier, VA	8.2	8.2	8.1
Chesapeake Bay, VA	7.1	7.2	7.7
Playa De Mar Beach, Spain	7.3	7.5	7.0

Dissolved Oxygen Tests			
Results (parts per million, ppm)			
	Test One	Test Two	Test Three
ECSU Campus:			
Complex D	7.6	8.0	7.7
Doles Hall	9.0	9.3	9.2
Butler Hall	8.4	8.0	8.2

Viking Village	1.8	1.4	1.2
Lake Cavalier, VA	9.5	9.7	9.9
Chesapeake Bay, VA	9.3	9.5	9.0
Playa De Mar Beach, Spain	9.0	7.0	8.0

Future Work

Future members of CERSER have collected more water samples while on trips to Philadelphia, Pennsylvania and Reno, Nevada. These samples will be compared with the samples we presently have from Lake Cavalier, Playa De Mar Beach, Spain, and The Chesapeake Bay. They will be used by future teams to further compare that water content varies from community to community and throughout the world.

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REFRENCES

[1]http://www.portsmouthva.gov/publicutil/ccr2004, Retrieved November 2007

[2]http://www.epa.gov/region3/about.htm, Retrieved November 2007

[3]http://www.portsmouthva.gov/publicutil/ccr2005/table2005.htm, Retrieved November 2007

[4]http://www.portsmouthva.gov/publicutil/ccr2005/moreinformation2005.htm, Retrieved November 2007

[5]http://www.portsmouthva.gov/publicutil/ccr2006/table2006.htm, Retrieved November 2007

[6]http://www.portsmouthva.gov/publicutil/ccr2006/definitions2006.htm, Retrieved November 2007

[7]http://www.hillsborough.wateratlas.usf.edu/shared/learnmore.asp?toolsection=lm_salinity, Retrieved November 2007

[8]http://nia.ecsu.edu/onr/03-04/researchteams/globe/abstract.html, Retrieved November 2007

[9]http://www.lamotte.com/pages/common/pdf/instruct/4824drlt.pdf, Retrieved November 2007

[10]http://nia.ecsu.edu/ureoms2006/pht_hydro_01.html, Retrieved November 2007

[11]http://nia.ecsu.edu/ureoms2007/photos/photos04_boat1.html, Retrieved November 2007