**LAB #1 WATER QUILITY TESTING**

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**Introduction:**

The objective of this lab is to determine the quality of water from different sources. The quality will be determined by multiple test that test many different qualities within the water.

The theory for this test is that the tap and bottled water will have better water quality than the water collect from creeks and streams. For safety it would be wise to wear protective clothing to collect water but it is not necessary.

**MATERIALS:**

For the materials you would use a LaMotte water monitoring kit, in this kit is the tablets and equipment that you will need to conduct your experiments. It comes with tubes test pills, temperate strip, a container to collect the water, a checkered like tab to test the turbidity of the water, and a booklet with steps for the experiments. If you want to test more than one source of water at a time you will need more containers. Gloves would also be smart to have for the collection and testing of the water. You will also need to have pen and paper to record your results.

**EXPERIMENTAL PROCEDURE:**

The following list gives you step by step procedure to follow to test the water that you have collected.

**Water collection**:

After you have found the water you want to test remove the cap of the container, then rinse the container 3 times with the water. Plunge the container to the bottom and hold it there, be sure to hold the opening where the stream flows into the container. Hold it like that for 30 seconds. Finally cap the container while it is underwater. Make sure to wear protective gloves

**Coliform Bacteria test:**

First pour the water into the provided container to the 10 mL line. Then place the cap back on. Stand the tube upright and leave it in room without direct sunlight for 48 hours. When you get the results compare to the result sheet and record the data.

**Dissolved Oxygen Procedure:**

First you will want to record the water temperature. Then fill a small tube with the water. After that drop two dissolved water test tablets into the tube. Place the cap on the tube and invert the tube continuously until tablets have dissolved. Wait 5 minutes. After compare the colors to the result sheet and record the results.

**Biochemical Oxygen Demand Procedure:**

Fill small tube with the water. After that wrap the tube with aluminum foil and store it in a dark place for 5 days. Unwrap the tube at the end of the 5 days and add two dissolved oxygen test tablets. Cap the tube and invert several times until the tablets dissolve. Wait 5 minutes. Compare the color results to the result sheet and record what you see.

**Nitrate Test:**

To perform this test fill the test tube to the 5 mL line. Add one nitrate wide range test tablet. Cap and invert until the pill dissolves. Wait 5 minutes. Compare results to the result sheet and record your results.

**pH Test:**

To begin this test ill the tube to the 10 mL line. Then add one pH wide range test tube. Cap and invert until the tablet dissolves. Compare the results to the result sheet and record what you see.

**Phosphate:**

The first step is to fill the water into a test tube. After that, add only one phosphate test tablet. Then you will cap and invert until the tablet dissolved. Wait 5 minutes for results. Finally compare the result sheet to your results and record them.

**Temperature:**

Gloves are optional. Take the temperature strip and record the temperature at your test site(s). Be accurate because future test results are greatly affected by these results.

**Results:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Coliform  Bacteria | Dissolved  Oxygen | Biochem.  Oxygen | Nitrate | pH | Phosphate | Temp. | Turbiduty |
| Site 1: Lynch | Positive | 4ppm;  42% sat. | 4ppm | <5ppm | 8 | 1ppm | 18o | 0 |
| Site 2: Hiarm | Positive | 4ppm; 42% sat. | 4ppm | <5ppm | 8 | 1ppm | 200 | 0 |
| Site 3: HCHS | Positive | 4ppm; 44% sat. | 4ppm | <5ppm | 8 | 2ppm | 20o | 0 |
| Bell C. tap |  | 8ppm; 99% sat. | 8ppm | 5ppm | 8 | 0 | 26o | 0 |
| Cumberland Gap | Negative | 4ppm; 48% sat. | 4ppm | <5ppm | 7 | <1ppm | 26o | 0 |
| Dasani | Negative | 4ppm; 49% sat. | 4ppm | <5ppm | 7 | <1ppm | 26o | 0 |

Other groups

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Harlan tap 1 | Negative | 4ppm; 48% sat. | 4ppm | <5ppm | 8 | 2ppm | 26o | 0 |
| Harlan tap 2 | Negative | 4ppm; 46% sat. | 4ppm | 5ppm | 8 | 0ppm | 22o | 0 |

**Discussion:**

**The coliform bacteria** test is a test for ecoli which is in feces. So, in theory, if water tests positive in this test the water would contain feces. In our test all water meant for drinking was negative for this test which is expected. All the water from natural running water, creeks, tested positive. This means that there is feces in the test sites, this doesn’t mean human feces though, it could just as easily be animal feces. Although our group did not test positive for coliform bacteria in bottled water the two other groups tested positive for coliform in their Dasani bottled water.

**Dissolved oxygen** is a test for the amount of oxygen in the water, the more oxygen the better it would be for your health. The higher saturation the more healthy water is in the aspect of oxygen. This would lead you to believe that bottled water would have the highest but it scored around the same area as the creeks. The best test result was from the Bell County water with 99% saturation.

**Biochemical Oxygen Demand** is the amount of oxygen that the living things in the water need to live. The bacteria in the water may consume all too much oxygen, resulting in dying aquatic life. As you can see our entire test had 4ppm besides Bell County which was 8ppm, which is still fair.

**Nitrate** test plant decay and growth. The more nitrate means more plant growth which means more plant decay which is more pollution leading to a water that is not as healthy. The higher the nitrate the worse the water. In this case plant growth can be a bad thing for the health of the water. For the most part our results were good for nitrate since most was less than 5ppm.

**Ph** tests the acidity of the water. The range is 1-14, 1 being most acidic and 14 being a base (pretty much the opposite of an acid). Good water will be in the range of 7 if it’s not 7 then 8 is the next best. Most of results were water with a pH of 8.

**Phosphate** test is a test that shows the amount of plant decay and plant growth which is very similar to the nitrate test. The lower the Phosphate the better the results. Although plant growth sounds like a good thing in the long run it can hurt the quality of the water. The more plant decay the less safe it because for drinking and less healthy.

Turbidity tests the clearness of the water. This does not count the dirt that has settles at the bottom but the water itself. All of the water had 0 Turbidity meaning that it is very clear.

**Conclusion:**

The conclusion of this test is that tap water is just as good as bottled water. Although Bell County’s tap water has a BOD of 8ppm that still isn’t bad, it is fair. Its Dissolved oxygen was by far the best. While the creek waters saturation was only a little behind the bottled water the positive results could make this water possibly unsafe to drink for long periods of time but will not kill you. Tap water was more of a base in pH than the bottled water was, but only by a little, not nearly enough to make a difference in health. Tap water in general is just as good if not better than bottled water and the clam by the bottled water company to be more pure is not as true as it seems.