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Final Lab Report

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Abstract

The water test is to be done for a number of elements that are expected to be contained in water. These are alkalinity, acidity, phosphorus, ammonium, chloride, oxygen, and pH. The elements were to be measured using color key. Testing for these will require one to conduct the following tests; bacteriological test, mineral tests, and organic chemical tests. Bacteriological tests are normally important in giving indication for bacteria such as coliform, Escherichia coli, and fecal coliform. Again, there is the test of organic chemicals which mainly focuses on testing whether a certain contaminating chemical has penetrated the water cycle or not (Chechowitz, 1995). This chemical contamination includes those from petroleum, industrial wastes, and pesticides.

Introduction

Water is a basic commodity that is needed for different purposes ranging from household to industrial use. For this resource to properly meet the expectations of the users, its quality must be good enough as well as be free from contamination. Contamination may be present from different activities such as pesticides. In the lab, one will examine the aspect of water quality and contamination by testing for micro biological contaminants, inorganic as well as chemical contaminants (Chechowitz, 1995). Testing for these will require one to perform the following tests; bacteriological test, mineral tests and organic chemical tests. Bacteriological tests are normally important in giving indication for such bacteria as coliform, Escherichia coli, and fecal coliform (Fairchild JF, 1997). Again, they also give an indication of whether the water contains disease causing bacteria or nor.

Next is the mineral test, which normally assists the researcher in establishing the mineral content of the water. It gives an indication whether the mineral

content in certain water is too high to affect health and the cleaning aptitude of the sampled water or not. A mineral test would test for such minerals as magnesium, calcium, manganese, zinc, copper, and iron among others. Finally, there is the test of organic chemicals. It mainly focuses on testing whether a certain contaminating chemical has penetrated the water cycle or not (Marvin Jung and Associates, 2000). This chemical contamination includes those from petroleum, industrial wastes, and pesticides. Form the studies done previously, it is notable that piped water that uses metallic pipes may contain lead and, thus, posing health risks to those consuming it. However, research has indicated that running the piped water for thirty seconds to two minutes before drinking it or using it for cooking may reduce the presence of lead consumed.

In testing for water quality, there are certain major components that need to be observed. These elements include water pH, temperature, chloride and salinity, turbidity, dissolved oxygen, ammonium ion, nitrates and phosphates among other elements including the solid ones. Each of these elements will give a certain activity that may result from the water. For instance, the temperature will indicate the biochemical rate of reaction, while the pH will give the acidity of the water. On the other hand, salinity will provide for the total non-carbonate salts that may have been dissolved in the sampled water (Walsh GE, 1982). Again, there is the element of dissolved oxygen which is important to aquatic life and plays a vital role in cellular respiration. An optimal range of oxygen in water is considered to be the best for quality water.

Therefore, the main objective of the laboratory test is to be able to test each of the above elements or components in water to determine whether it is contaminated and whether it meets all the required qualifications for it to be considered of good quality or not. Though there is the general way of quality of water, it is, however, important to be noted that this quality is determined by the intended purpose of the water (Marvin Jung and Associates, 2000). For instance, drinking water requires high quality standard that could be different

from the one used for farming. In order to ensure proper sample representation, water samples will be collected from different boreholes within the entire region.

Materials and Methods Used

The materials that were to be used included: Dasani® bottled water, Fiji® bottled water, Ammonia test strips, Chloride test strips, 4 in 1 test strips Phosphate, test strips Iron test strips, (3) 250 ml Beakers, Permanent marker, Stopwatch, Para film®, tap water, Pipettes, and (3) Foil packets of reducing powder.

The first method that is to be used will be electrical conductivity. This is a method used to test for the level of salinity in the water. While performing the test, two electrodes, wires, and a battery are required. The following procedure is then followed; one ties one end of each of the wires to an electrode, while the other ends should be connected to the battery. Then one places the two electrodes in a beaker containing the sample water and places them apart. Then one should wait for about six hours and make an observation. If the salinity is too high, a layer of the impurities present may form around one of the electrode. Again, the same process can be used to determine the water pH. If such impurities deposit round an electrode, it means that the acidity level of the water is too high and vice versa.

Next to be tested was the turbidity of the water. This means the concentration of particles present in the water. During the experiment, a researcher should have a test tube and a source of bright light. The test tube is then filled with water and placed near the source of light. This helps to measure amount of light reflected at 90 degrees from the water particles. This reflection, in turn, gives the researcher the concentration of foreign particles present in the

water, which is known as turbidity. The test is performed physically.
The other test to be done will be that of dissolved oxygen. The test requires the use of an electrode made of galvanic membrane, as it reacts with oxygen present in the water, thus, creating a voltage that is measurable. The test of dissolved oxygen is a physical test. The water sample is used as a standardized reagent which vigorously regulates it. Bubbling air through the water is then carried out with an intention of producing a solution that is 100 % saturated and which is used as the standard solution. The process of calibration is done in an automatic manner, as opposed to using the machine to do it manually.

Next to test for is the presence of nitrogen. The laboratory puts into use a colorimetric module to make a test for total amount nitrogen present. The process of this testing requires a total of about 12 chemicals. During testing, digestion process is involved to help in breaking down the different and complex organic compounds of nitrogen. Then, there occurs a reduction process, reducing most nitrates to nitrites, thus, making the color reaction to work. After a little while, the color reaction occurs and a reading of the color is done.

Furthermore, a test for the presence of nitrate in the water must be performed as well. During the testing process, a reagent is poured into the water to compound any inquisitive ions. The method used in the event of testing nitrate is by using ion specific electrode. This ion specific electrode reacts electronically with the nitrate ion. However, there could be presence of other ions that may also react with the ion specific electrode, thus, interfering with the expected results from the test. To try and address this problem, the laboratory has developed means of compressing such ions that cause interference to the ion behavior. This is done by addition of a reagent that is intended to make the ions complex, thus, making it impossible for them to react with the ion specific electrode and, hence, avoiding their interference.
The next test to be done is that of the presence of ammonia. During the test

for ammonia, the laboratory used the ion specific electrode (ISE) method. Further, there is the addition of a new reagent to cause the adjustment of the pH, thus, making it complex enough to avoid interference. The ISE reacts electronically with the ammonia ion. The ISE is able to sense a gas and is, hence, able to measure the concentration of ammonium ion when it is converted to ammonia gas. The ammonia gas is able to penetrate through a membrane on the end of the said electrode and is actually measured inside that electrode. Presence of other ions in the water that may interfere with the results is curbed through addition of less concentrated acid to lower the level of interference.

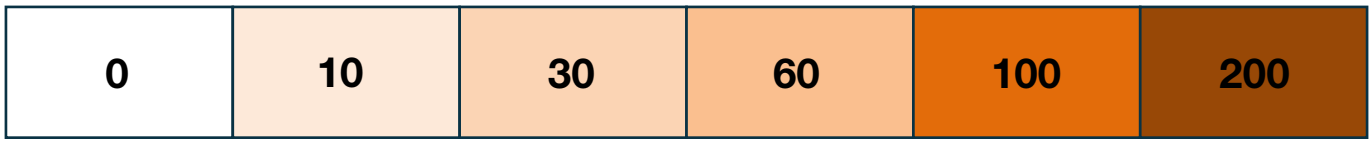
Finally, the last test to be conducted is that of presence of phosphorous properties. The method to be used in this case is the ascorbic acid method, which helps in measuring the amount of phosphorus present in the water. Chemicals are poured into the water to mix with the phosphorous particles thus turning the water blue. In that case, the bluer the water is, the more the level of phosphorous in the water and vice versa. To measure this blueness, a spectrophotometer is put into use. This is done by passing a bright light through the water medium and observing the amount of light absorbed at each point of the wavelength. Orthophosphate and ammonia molybdate react in presence of an acidic reagent being reduced to an extremely blue colored molybdate due to ascorbic acid.

Results

Ammonia

The ammonia presence could be recognized though not in high concentration, as it registered a 30 for piped water, while for Dasani and Fiji

water, it was at 0.



Phosphate

The levels of phosphorous in Dasani and Fiji water were also slightly lower, as compared to that of tap water which was found to contain high levels.
Dasani and Fiji bottle water stood at 0
Tap water test stood at 10.

Iron

Iron presence was as well found to be present in tapped water, as opposed to the other two bottled water. The tapped water key stood at 1.0, while that of Dasani and Fiji were at a lower rate of 0.15.

Chlorine

For chlorine, it was found that tapped water recorded a 1.0, while the rest of water samples recorded 0.

Alkalinity

The test for alkalinity for all the three samples was at 7 pH. That is, it was neutral.

Discussion

From the above results, it could easily be established that water is a neutral component in regard to test for acidity or alkalinity. However, where the piped water is from the rain, it may contain acidity level of a pH of 6, which is the lowest level of acidity and is close to 7pH, which is the neutral position. In the case of iron, it is clear that tap water contains some elements of iron which appear as a result of the pipes used have been made of which could have been caused by metal pipes made of iron. Again, it is important to note that the presence of chloride in piped water is attributed by addition of chlorine in water by companies to reduce the risk of having disease-causing bacteria. However, that is not the case regarding to bottled water. Again, there is the presence of phosphate which can be attributed to non-purification by the water piping companies.

Conclusion

In conclusion, bottled water can be said to be more secure for consumption, as compared to the piped water. Again, some impurities in the tapped water are caused by the piping system itself, which can be changed by use of the PVC pipes. Concerning acidity and alkalinity, although s water is said to be neutral, tapped water may be affected by the rain water and, thus, may contain little level of acidity.

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