Science Fair Conclusion Example #1

 Based on my data and the results from my experiment, my experimentation proved that my hypothesis was correct in terms of the reduction of chlorine content. My hypothesis stated that carbon block filtration would be the most effective in removing chlorine from drinking water as a result of the binding agent present in carbon block filtration, as well as the smaller pores of the carbon block (as opposed to the larger pores of granular activated carbon, or GAC). My results show that as the type of water filtration system changes, the reduction of chlorine (and presumably the reduction of lead content) changes as well. In this experiment, I learned that carbon block water filtration systems reduce the chlorine levels of drinking water more effectively than GAC filtration systems do.

Although the chlorine content of the water samples from different sources varied slightly, the Everpure H-300 filter, which represents carbon block water filtration, was the most effective in removing the chlorine content from drinking water. The control variable in my experiment, which was the unfiltered tap water from both sources, allowed for the collection of data regarding the quantity of decrease in chlorine. The water that was filtrated using the Brita filter, which represents GAC water filtration, possessed and average of 2.0 PPM (Parts Per Million) chlorine prior to the filtration. After the filtration, this same water possessed the chlorine content of 0.6 PPM. Using this data, I can conclude that the Brita filter decreased the chlorine content of the drinking water by 1.4 PPM. My results regarding the reduction of chlorine in drinking water using the Everpure H-300 filter shows that prior to the filtration, the drinking water from source two possessed 1.5 PPM of chlorine, and after the filtration, the drinking water showed no sign of any chlorine content. Therefore, the Everpure H-300 filter succeeded in reducing the chlorine content of the drinking water to 0 PPM, which shows a total reduction change of 1.5 PPM. Because the Everpure filter reduced the chlorine content of the water by 0.1 PPM more than the Brita filter, the Everpure Filter was thus more effective in reducing the chlorine content of drinking water.

As my results concerning the chlorine water testing show, my hypothesis was correct. I believe that my experimentation supported my hypothesis for many reasons regarding both the physical attributes of carbon block and GAC filtration, as well as the situation in which my experiment was conducted. In terms of the design of each type of filtration, carbon block filtration is physically more accurately equipped for removing chlorine in drinking water as a result of varying distinctive properties of carbon block granules. Carbon block granules, which is the material used in carbon block filtration systems, possesses much smaller pores than GAC granules do. To be specific, GAC granules are 0.3mm to 0.84 mm, whereas carbon block granules are 0.045mm to 0.18mm. In this way, the particles of carbon in carbon block filters are 7 to 19 times smaller than the particles of carbon in GAC filters. The pore size of water filters is extremely important because it determines and affects the contact time of the carbon and the water. The smaller the pores of the carbon are, the longer amount of time the carbon has to come in contact with the water. A longer contact time results in a more effective removal of both lead and chlorine content. Thus, carbon block filtration is more effective and my hypothesis was correct.

Regarding the lead content of the drinking water in my experiment, I wasn’t able to completely analyze me results, or make a conclusion about the accuracy of my hypothesis due to complications with the data. I tested the lead content of drinking water from both sources twice, the first time using lead-detecting strips that were able to detect lead down to 1 part per million, and the second time, using a more accurate lead testing solution that was able to detect the lead down to 15 parts per billion. However, with the both of these tests, my results were inconclusive for varying reasons. The first set of results couldn’t be completed because my water possessed no detectable lead above 1 part per million. Considering that the acceptable regulation of lead in drinking water set by the Environmental Protection Society is 0 parts per million, these results were to be expected. I then conducted the second test using the more accurate lead-detecting solution that detected lead content down to 15 parts per billion. Yet again, neither water source contained any detectable levels of lead. Thus, the only data that I could gather form this section of my experimentation was that prior to filtration, the drinking water from the taps of both sources of water contained lead content below 15 parts per billion.

While my experimentation did not produce any outliers in terms of my data, there was an unpredictable alteration with my data. If I were to repeat my experiment, I do believe that I would get the same exact results because each trial for each specific section of the experiment was the exact same. However, regarding the testing for chlorine in water, my results showed that there are two different types of chlorine: Free chlorine and combined chlorine. According to the chemical testing kit that I used for my chlorine experimentation, the measurements for free chlorine are gathered immediately after a certain solution is mixed with the water, and the measurements for combined chlorine should be taken two to three minutes after the solution has been mixed with the water. My results concerning the free chlorine in both sources of water before and after the filtration show a slightly different conclusion than the results for the combined chlorine do. According to my data for the quantity of free chlorine, the Brita filter (GAC filtration) reduced the chlorine levels of the water by 1.4 PPM, and the Everpure H-300 filter (carbon block filtration) only reduced the chlorine levels by 1.0 PPM.

I believe that this alteration in my data occurred due to the varying sources of water. My experimentation involved using tap water from two different sources because while the Brita filter is a small, portable device that I could easily operate using the tap water from my own home, the Everpure H-300 filter is a large device installed in refrigerators. Thus, I had to use pre-filtrated and post-filtrated water from my neighbors, and surprisingly, the chlorine content of the water from the two different sources were actually severely different. I hoped to offset this variation in initial chlorine quantity by basing my analysis of my results on only the amount of change in the chlorine content of the water. However, complications still arose. Prior to the filtration, the Everpure H-300 water source contained 1.0 PPM of free chlorine and 1.5 PPM of combined chlorine, and after the filtration, both the free and combined chlorine was a quantity of 0 PPM. Therefore, the change in the post-filtration free chlorine level of the Everpure H-300 water was significantly less than the change in free chlorine of the Brita filter after filtration. With a pre-filtration free chlorine content of only 1.0 PPM, the Everpure H-300 filter could very well be just as effective as the Brita filter, but the initial free chlorine content would have to be much higher in order for me to analyze the actual reduction of chlorine. Because of this, I decided to use the combined chlorine results as a final conclusion because I could accurately measure the reduction of chlorine by each type of water filtration. (The results for the combined chlorine content were that the Everpure H-300 reduced the chlorine content of the water by 1.5 PPM, and the Brita filter reduced the chlorine content by only 1.4 PPM, showing a difference of 0.1 PPM.)

Based on the complication with the free chlorine levels and the inconclusive lead data, if I were to conduct this experiment a second time, I would find a way to use water from a singular source. This water source must have access to both a Brita filter and an Everpure filter in order to insure an accurate analysis of the reduction of both free chlorine and combined chlorine. In addition on to the need for a fairly high quantity of chlorine, this water source must also possess a quantity of lead high enough to be detectable by at least 15 parts per billion. The obstacle of this experiment was primarily that everything I used in my experimentation was not only a representation of real-world implications, but the water itself as well as the filters were objects of daily use. Thus, it would be extremely hard to find tap water with such high levels of lead and chlorine as well as access to such precise filtration devices, mostly because high quantities of lead and chlorine in water (especially lead) are extremely dangerous and could therefore not be found in any home of any average citizen.

Despite the complications with my experiment, I have learned about many significant aspects of my everyday life as well as the lives of those around me. The most shocking discovery from this experiment was the fact that the tap water of most average citizens is infused with vast amounts of both free and combined chlorine. While the acceptable amount of chlorine in drinking water is between 0.2 and 0.5 mg/l, which is approximately 0.2 to 0.5 PPM, the pre-filtrated tap water from both sources of water in my experiment contained 1.5 and 2.0 PPM of combined chlorine (which is between 1.0 and 1.5 PPM more than the acceptable standard of chlorine). This shows that the tap water of many citizens in the United States, and possibly the world, are drinking unhealthy amounts of chlorine. Not only is chlorine in water unhealthy, it also vastly affects the taste and odor of water, and can eventually lead to chlorine poisoning. In this way, from my experiment, I have learned that all citizens living in Chicago are constantly drinking water with unhealthy amounts of chlorine. Because all those residing in this specific city rely upon Chicago's municipal water filtration system, we are all at risk of the effects of chlorine ranging from mild changes in odor and taste to chlorine poisoning.

Because of these prominent quantities of chlorine in Chicago's water, I have learned that water filtration systems are absolutely necessary. All Chicago citizens should use carbon block filtration systems due to the need to effectively and efficiently filter out the chlorine in their tap water. Thus, Chicago’s tap water is neither sanitary nor safe as a result of our municipal filtration system. I believe that the regulations concerning the amount of chlorine added to our water during the filtration process should be greatly altered. While small amounts of residual chlorine are absolutely necessary for the further protection of water against bacteria, the amounts of chlorine found in my own tap water as well as the tap water of my neighbor are extremely high. As a community, we need to take action towards eliminating harmful chemicals such as chlorine that are very much a part of the tap water that we consume every day of our lives. After all, if such high levels of chlorine are apparent in our water, how do we really know what we're drinking?