Name(s)

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Project Number

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Project Title

The Effects of Metal Pipes on Potable Water Quality

Abstract

Objectives

The objective of the experiment was to determine the extent of metal contamination in drinking water when using metal pipes. The question was: What is the effect on drinking water when using metal pipes? I hypothesized that the amount of metal in drinking water does increase to a significant level upon standing in metal pipes over time. The experiment consisted of three types of pipes: Back Steel, Brass, and Copper. I filled each pipe with one of each water types: distilled water, garden hose water (hard water), unfiltered soft tap water, and filtered soft tap water. I tested the waters in each pipe using 2 types of heavy metal testing kit every two days for 12 consecutive days in total. I made observations over the testing period and recorded the results. On completion of the experiment, I observed that black steel is not a safe pipe to use for any water transportation. Brass pipes can still do harm, due to the increase in pH and alkalinity, and that Copper pipes appear to be the safest pipes to use for drinking water transportation as it did not leech significant amount of metal, compared to black steel and brass. It also maintained healthy levels of pH and alkalinity. My hypothesis was proven correct. The concentration of metal does go up within days of the water sitting in them and hence water should be drained from pipes after not being run for long periods of time.

Methods

2 Copper pipes and caps, 2 Black Steel pipes and caps, 2 Brass pipes and caps, Distilled water, Garden hose water (Hard Water), Unfiltered, Soft Tap Water, Filtered, Soft Tap Water, and 2 types of heavy metal testing kit. Each pipe had water poured into it and testing with both kits was done every 2 days for 12 days.

Results

From my experiment, I found that copper pipes are the safest material to store and transport our drinking water. Brass pipes are still usable but the pH and Alkalinity changes which can eventually hurt one's health. Black steel pipes should not be used for water at all, due to the dangerous change in metal content.

Conclusions

The concentration of metal does go up within days of the water sitting in the metal pipes and hence water should be drained from pipes after not being run for long periods of time. Selection of the right materials to transport water has a dramatic impact on drinking water. Pipes that leech harmful materials such as lead or iron can be fatal for a human, such as what we see occurring in Flint, Michigan with lead water pipes. According to fondriest.com the EPA had revealed that one-fifth of all Americans have already been exposed to water that was potentially unsafe at least once over the past ten years. So utilizing high quality and safe piping like copper is important.

Summary Statement

Analysis of the effects of metal pipes on potable water quality.

Help Received

I carried out the research and experiment by myself. Financial support was done by my school and parents. My teachers reviewed my project and helped analyze my results. Orange County Water District helped me understand how water is transported and the Chief Operations Officer at CWE Environmental