CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

Zackary G. Tuzar

Project Number

38771

Project Title

Can Coffee Grounds Absorb Heavy Metals?

Abstract

Objectives/Goals

The objective of this study is to find out whether used coffee grounds can absorb heavy metals from lead contaminated water.

Methods/Materials

Materials: ~168.816* milliliters of grounded spent coffee grounds, 1 Lead disk, Gloves to handle the lead, One 473.176 mL. paper cup, ~487.9632 milliliters of water (100॰ Celsius), ~236.588 milliliters of silicon, ~168.816 milliliters of sugar, 20 Heavy Metal test strips.

Procedure: Gather materials and put on gloves. Pour boiling water into a cup. Immediately put one lead disk into the cup. Wait 24 hours. While waiting, mix all of the silicone, finely ground coffee and coarse sugar thoroughly. Using the lead test strips, measure and record the lead content of the water. Try to remove the sugar from the hardened silicone mixture so that it is porous. Cut up the hardened silicone mixture into small pieces of approximately 3 cm x 2 cm so that the water will have a greater exposure to the material .Put one fifth of the cut up hardened silicone mixture into each cup of lead water .Wait 24 hours. Using the lead test strips, measure and record the lead content of the water. Dispose of the used silicone mixture and the water. Repeat steps 2-11 four more times. Calculate the average difference between the amount of lead before and after the silicone and coffee ground mixture is put in. Using a bar graph and Google Sheets, graph and compare the data.

Results

My results prove that when spent coffee grounds are left to sit for 24 hours in lead contaminated water, there is an average of 90% lead reduction in the water.

Conclusions/Discussion

The question answered in the project "Can Coffee Grounds Absorb Heavy Metals?" is, "Do used coffee grounds absorb heavy metals?" The data shows that the amount of lead in the water before the hard silicone mixture interacted with it is noticeably more than the amount of lead after the hard silicone mixture had been exposed to the lead water for 24 hours. Based on the results, the data shows that the average amount of lead after the silicone mixture exposure is about 5 ppb (parts per billion). This means that on average, 90% of the lead in the water was extracted by the hard silicone mixture in just 24 hours. Therefore, one can utilize the over 16 billion pounds of coffee grounds disposed of annually for the crucial purpose of water purification.

Summary Statement

I was able to record that after 24 hours of exposure between spent coffee grounds and lead contaminated water, an average of 90% of the lead in that water was eliminated.

Help Received

I performed the tests and research by myself at home but asked Ben Page, a student at the University of Vermont, what the compound inside of the coffee grounds might be that filters out the lead.

Preliminary