CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1101

Project Title
Why Mummify if You Can Say Goodbye? Comparing Biodegradation in Dry-tomb and Bioreactor Landfills by Measuring CO(2)

Abstract

Objectives/Goals
The objective is to use carbon dioxide measurements (an end product of bacterial degradation), to determine if the new Bioreactor landfill design could be a better option for the disposal of municipal trash than traditional dry-tomb landfills. To take things a step further, both traditional papers/plastics and biodegradable papers/plastics were compared in each landfill prototype.

Methods/Materials
I built two Bioreactors and two dry-tomb landfills, proportioning the trash the same way as in a real life municipal landfill. Each Bioreactor and Dry-tomb landfill set had either traditional papers/plastics or biodegradable papers/plastics. Using a Q-Trak instrument, I measured the carbon dioxide in each prototype through a resalable port over a period of six months. On a monthly basis, I added 30% of the field capacity of liquid to each Bioreactor in the form of leachate/storm-water.

Results
Through the experiment, I determined that the Bioreactor with biodegradable papers/plastics showed the highest average and total carbon dioxide concentrations over a period of six months. The dry-tomb landfill with biodegradable papers/plastics and the Bioreactor with traditional papers/plastics were fairly close in carbon dioxide levels. The dry-tomb landfill with traditional papers/plastics demonstrated the least amount of carbon dioxide.

Conclusions/Discussion
Based on my experiment, I concluded that on a small scale that Bioreactors are a viable option for municipal waste disposal; providing additional landfill space through accelerated decomposition, as an immediate solution to more effective waste management the use of biodegradable papers/plastics will provide a significant impact to the status quo landfill design.

Summary Statement
Comparison of Biodegradation in Dry-tomb and Bioreactor Landfills By Measuring CO2.

Help Received
My mother and father helped get various tools needed. Grandma gave encouragement. I love you Grandma, this one's for you!