Nouveau Garbage
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Introduction:

The environment is a delicate thing, which must be carefully managed for it to retain its wonderful, life-sustaining properties. In order for this to happen, the interactions between the biotic and abiotic factors in an environment must be kept harmonious and productive. We, as humans, also play an important role in the environment, and it is partly up to us to do this.

At the moment however, we are destroying this delicate and imperative balance in nature with our many landfill sites. Although these sites may seem like the perfect garbage disposal option, they have the ability to permanently damage these harmonious interactions by their leachate pollution. And, every day, we add to this damage by creating more and more new, durable materials. How will these materials decompose? How will the environment affect them, and, more importantly, how will they affect the environment?

To further study these effects, I propose to place twelve different modern materials into four different natural substances in order to see the effects each will have on the other. I predict that, in this experiment, water will decompose these materials the fastest, and that organic materials (wood) will decompose the fastest while the two types of plastic (Ziploc bags and Glad Cling Wrap) will decompose the slowest. This investigation intends to prove the need to manage our land resources in order to sustain a stable environment for future development. This is essential to create a healthy balance for a sustainable global environment.

Materials/Procedure:

Place These Materials:

Ziploc bags, pine wood, pencils, elastics, glass, nails, waxed paper, aluminum foil, Glad Cling Wrap, blank paper, lined paper, and cardboard

In These Substances

Water, peat moss, sand, and soil

For 124 days.

Observations:

Through my tests, I have discovered much information about the decomposition of our modern materials, and how they may decompose in a landfill. Below are some of my measurements that have helped me to draw my conclusions.

In addition to this test, I also measured the density of each of my materials over a period of three weeks. The graphs below show these measurements and should offer some insight into the density changes of our modern materials when placed in a landfill, and therefore also help to determine any decomposition of these materials; if a material has any change in density, then it is either absorbing material from its surroundings, or it is leaking part of itself into its surroundings. This means that any change in density could foretell, in a landfill, the formation and release of harmful leachate into the environment.

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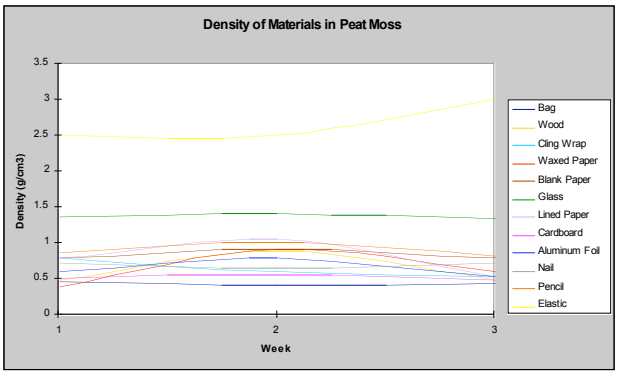

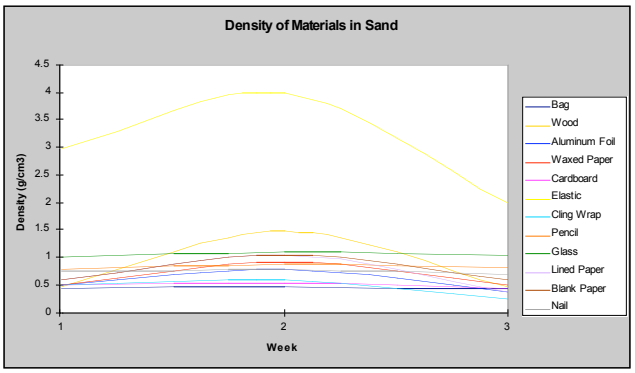

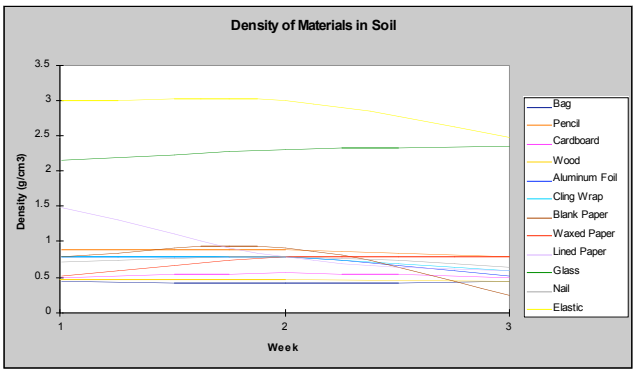

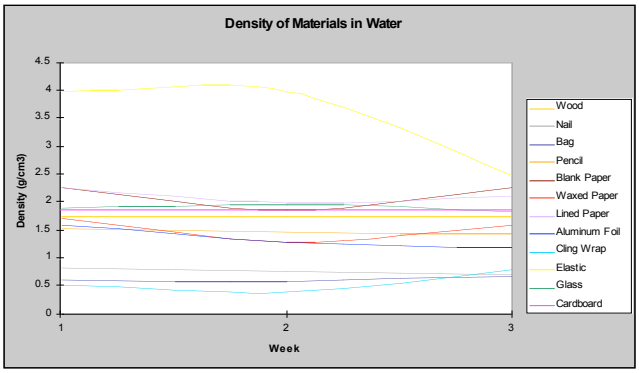

As another aspect of my project, I swabbed each of my materials on a plate of nutrient agar to determine what bacteria had been acting on the

decomposition of these materials. Through these tests, I was able to determine the presence of a large quantity of *cyanobacteria*, a bacterial species known as blue-green algae. Their presence tells me two main things. Firstly, as I had anticipated, the soil, peat moss, and sand that I used in my experiment were not completely dehydrated, otherwise this species of aquatic bacteria would not have shown on my swabs. In addition, this means that these *cyanobacteria* were involved in the decomposition of the materials I experimented with.

Conclusions:

From this experiment, I have gathered much information, some of which is surprising and some expected. Firstly, I have proven my hypothesis correct: organic based materials did show the most signs of decomposition, while plastic showed the least. Also, of the four substances I placed these materials in, water seemed to affect the largest amount of them. As also anticipated, none of these materials showed any major signs of decomposition.

Despite the fact that the minimal decomposition of these materials does not seem significant, even their slight changes are a cause for concern. This is because, in a landfill, any decomposition, no matter how slight, creates a large risk of the formation of harmful leachate, which could then leak into the surrounding environment, causing heavy pollution of our earth. In addition, I only tested my materials for a short period of time, meaning that, after spending perhaps years in a landfill, these products would likely decompose even more than they already have.

Because of this, I can conclude that the decomposition of our materials when in a landfill environment is a cause for serious concern. We need to spend more time on investigating these effects and learning to prevent them in order to keep the interactions between the biotic and abiotic factors in our environment harmonious, and to make sure that our environment will sustain our development in the years to come.

Applications:

These results can most easily be applied to our current garbage disposal system – the landfill. If these materials decompose, as they have been shown to do (at least slightly), then the risk of a harmful leachate forming and being released into the environment is substantially increased. For the sake of our planet, this cannot be allowed to happen.

In order to prevent this environmental disaster from occurring, we need to either modify our products so that they do not decompose, or develop a completely new system of garbage disposal. Another option would be to make biodegradable plastics, papers, rubbers, and other products that, when used, would disintegrate into the environment without releasing harmful chemicals or other materials that could damage the environment.

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Appendix 1: Bibliography

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