CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
S0516

Project Title
The Effects of D-Limonene Extracted from Different Citrus Fruits on the Disintegration of Polystyrene Foam

Abstract

Objectives/Goals
The purpose of this experiment was to determine the effects of d-limonene extracted from different citrus fruits on the disintegration of Polystyrene foam, widely known as Styrofoam.

Methods/Materials
The d-limonene was collected by extracting oil from limes, lemons, orange, tangerines, red grapefruit, and oroblanco grapefruit. The oils were extracted by shaking ethanol and 50g of each citrus fruit's peels together, dissolving the oil in the ethanol. The solution was filtered and evaporated to obtain a pure extract oil. The extracted oils were applied onto Styrofoam blocks to compare the effects and disintegration.

Results
The results showed that all the citrus fruits disintegrated Styrofoam, but red grapefruits disintegrated the most by an average of 6.742cm3, and the lime the least by an average of 2.290cm3. The % deviation ranged from 6.33-12.55%. In general, the thicker the peels, the more it disintegrated. But overall all the fruits were respectably effective in disintegrating Styrofoam.

Conclusions/Discussion
In conclusion, all the citrus fruits disintegrated the Styrofoam, the red grapefruit having the most effect and the lime the least. This can be applied into a system in which the citrus fruit peels and Styrofoam, both a prominent waste product, can be collected and processed to reduce waste. It can be estimated that this would slowly but surely improve the environment by diminishing landfills and can be used as an alternative to the incineration of Styrofoam in which hazardous chemicals had been released to recycle.

Summary Statement
This project was about discovering the effects of d-limonene extracted from different citrus fruits on the disintegration of polystyrene foam.

Help Received
Father helped in the experiment; Mr, Antrim helped in my experimental design and gathering material.