CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J0510

Project Title
Elastic Plastic

Abstract

Objectives/Goals
My science fair project, titled Elastic Plastic, tests the strength of plastics made from a mixture of milk and an acid. The goal of my project was to find out which acid will produce the strongest plastic and why.

Methods/Materials
I used three different types of acid to make the plastic: lemon juice, orange juice, and vinegar. I made the plastic and then I formed the plastic into small spheres. I took these spheres after cooling them for a certain amount of time and I placed them on a scale. I used a butter knife to apply a force perpendicular to the plastic. I calculated how much force it took to break the plastic by recording the amount of mass as read from the scale when the plastic broke.

Results
After testing this I discovered that the plastic made using lemon juice was the strongest followed by vinegar, and then orange juice.

Conclusions/Discussion
Conclusion:
My hypothesis was that the Lemon Juice would produce the strongest plastic because it has a lower pH than the other two acidic liquids and it could therefore produce a stronger chemical reaction. My hypothesis was supported because the plastic created using lemon juice required more pressure to break than the other two plastics.

Discussion:
These are interesting results because they show that acids with a higher pH (lemon juice) make stronger plastics. This is most likely true since there is a higher concentration of hydrogen ions in lemon juice than the other acids, so it is able to form more chemical bonds. Since the lemon juice plastic has more bonds, its molecules can form polymers of more complex patterns, which fortify the substance. This information could be used in the real world when manufacturers are constructing plastics. Using this information they could vary the strength and durability of their products depending on what materials they use to make their products.

Summary Statement
The strength of plastics made from a mixture of milk and different acids.

Help Received
Father suggested using a scale to measure pressure; Mother helped cut and paste papers onto the display board.