



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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Project Title
What Effect Does a Solution's Temperature Have on the Duration of a Bubble Film?

Abstract

Objectives/Goals
The purpose of this experiment was to find the optimum temperature range for bubble solution to produce the longest lasting bubble film. I became interested in this topic when I began my research I learned that bubble science has many useful applications in fire suppression, agriculture, and pure research. My question is, #What Effect Does a Solution's Temperature Have on the Duration of a Bubble Film?# My hypothesis is that the greater the temperature of the solution the shorter the duration of the film.

Methods/Materials
My experiment began with the design and building of a bubble film device. I then prepared the bubble solution using 250 mL Original Dawn dishwashing soap,65 drops of glycerin and 4 liters of tap water. The solution was either refrigerated to 3° C,kept at 18°-20°C or heated to 33°C and 45°C. on a hot plate. The solution was poured into the bubble device and allowed to soak into the wooded dowel for 10 minutes. 40 trials for each temperature range were completed and duration time was recorded. A 20 second soak time was maintained between each trial as a control.

Results
My raw data for the 5-7° C range produced a bubble film with an average duration of 45.97 seconds. The 18-20° C range produced an average of 42.62 seconds. The 33-35° C range produced an average of 31.63 seconds. The shortest duration was found in the temperature range of 45-51° C range producing a bubble average of 23.19 seconds.

Conclusions/Discussion
In conclusion, I found that my hypothesis was partially supported. The 5-7° C group had the most outliers and was skewing the data especially when calculating the average for each temperature range. The possible reasons for the outliers were that it was difficult to keep the solution cool enough or the concentration of the detergent or the glycerin on the bar may have been greater or lesser during some trials. Then when I got rid of the outliers in the 5° - 7° C range I found that the averages and the median for that temperature range became more accurate. The solution at room temperature was the temperature range that produced the bubble film with the longest duration. The coldest temperature had too many outliers to accurately calculate its data. I think that at room temperature the surface tension of the water is lowest and the rate of evaporation or decent of water towards the bottom is slower. This may be due to the bonding attraction of the water molecules.

Summary Statement
The project is exploring the effect of a solution's temperature on the duration of a bubble film.

Help Received
My father helped me with the statistics by explaining how to find the standard deviation and my mother helped me time my trials,