



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Jaimie M. Mayner	Project Number S0510
Project Title Is Rinsing Your Apple Enough?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is determine whether or not rinsing is an effective method of removing pesticides and preservatives from apples. Specifically, I tested Diphenylamine, a common antioxidant found on most apples. Because Diphenylamine is slightly soluble, I hypothesized that the longer I rinsed an apple slice, the less Diphenylamine would remain.</p> <p>Methods/Materials Four apples were cut into four slices to eliminate the variability from apple to apple within a batch. Each apple slice was rinsed under a tap for varying time periods of 0, 15, 30, and 45 seconds. The slice was then sonicated in 150ml of water for 20 minutes to hasten the dissolving of the Diphenylamine. 20 micro liters of an internal standard D-10 Diphenylamine was added and an SPME Fiber was then injected to adsorb the Diphenylamine and internal standard molecules in a process called solid phase micro-extraction for 30 minutes. This SPME Fiber was then injected into a Gas Chromatograph-Mass Spectrometer, which separates the injected compounds and measures their abundances based on their molecular masses. The ratio of the abundances of the Diphenylamine and the D-10 Diphenylamine were then compared to calculate the mass of Diphenylamine removed during the sonication process. The difference in amounts of Diphenylamine removed after rinsing and without rinsing was the amount of Diphenylmaine removed due to rinsing.</p> <p>Results There appeared to be no correlation between the time spent rinsing each apple slice and the amount of Diphenylamine detected by the GC-MS. There was even more variation from apple to apple than there was between each apple slice rinsed for varying time periods. Out of interest, an organic apple was tested and was found to not contain any Diphenylamine.</p> <p>Conclusions/Discussion Because there was more variation from apple to apple than there was between apple slices rinsed for different periods of time, rinsing is an ineffective method for removing additives. Even if a miniscule amount of Diphenylamine is removed while rinsing, it is an insignificant amount because there theoretically could be much less Diphenylamine on a different apple from the same batch that hasn't been rinsed.</p>	
Summary Statement My project tests to see how effective it is to rinse apples with water to remove the common preservative Diphenylamine using a Gas Chromatograph-Mass Spectrometer.	
Help Received Used lab equipment at UCSB under the supervision of Dr. James G. Pavlovich, Ph.D.	