



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Andrea N. Betts	<b>Project Number</b> <b>J0402</b>
<b>Project Title</b> <b>What Is the Effect of Various Oxygen Inhibitors on the Discoloration of an Apple?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My hypothesis is that the lemon juice and lime juice will reduce the oxidation process the most. I based my hypothesis on finding that lemons and limes have particularly high concentrations of citric acid, an antioxidant.</p> <p><b>Methods/Materials</b> 6 1/2" slices were cut from one apple. Each slice was soaked for 10 seconds in 1 of 7 different liquids known for reducing oxidation process in apples. Pictures were taken every hour for 5 hours. Pictures were measured for saturation and brightness using PhotoShop Elements 6. Data was calculated to determine results.</p> <p><b>Results</b> The scale of brightness measures 0% to 360%. In the first hour, the brightness score for lemon started at 73% and it decreased quickly down into the range of 50%. Lime started at 73% and decreased more quickly than lemon. 7-Up started at 71% and gradually got darker. Fruit Fresh started at 65% and got darker, but at a little faster rate than 7-Up. Orange started at 71% and gradually decreased. Water was my control group, which started at 71% and quickly decreased. The results of the saturation test done on each apple wedge show findings similar to those on the brightness test.</p> <p><b>Conclusions/Discussion</b> My conclusion is that whatever substance you put on the apple the effect will be similar. After doing this experiment twice, my hypothesis was proven wrong. Although the lemon juice and lime juice did score higher some hours, there was not a significant difference between them and the other substances used. As research shows, when you cut an apple open you are exposing the enzymes to oxygen. If you can find a way to dilute the enzymes it can decrease the oxidation process. Oxidation is the process in which the apple turns brown. In my visual observations I saw some difference in the darkness between the apples, although it was not as dramatic as I expected. With the computer analysis, I measured the actual brightness and darkness in the picture of each apple wedge at set time intervals. It showed that all the apples had close to the same or the same effect.</p>	
<b>Summary Statement</b> I am doing this project to find the best oxygen inhibitor to prevent an apple from discoloration after it is cut.	
<b>Help Received</b> Father helped make graphs; Mother helped cut apples; project supervised by teacher- Mark Sherwood	