



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Donald S. Mathis	Project Number S0509
Project Title An Investigation of Oxygen Exposure and pH Levels	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Is it possible to alter the pH of a selected fruit juice (orange) by varying the volumetric exposure to oxygen?</p> <p>Methods/Materials Fresh oranges were obtained, washed, peeled, then squeezed. The juice was collected into a very clean mason jar where the pH was measured for a control. To measure the volume of the test tubes, they were filled completely with water, and then a stopper was added, which displaced the water. The water in the test tubes was emptied into a graduated cylinder to accurately measure their respective volumes. The test tubes were marked at various levels corresponding to target volumes to serve as a guide when adding the oxygen. When testing, the test tubes were completely submerged into the juice and inverted, with the top still submerged in the juice. A vinyl tube was inserted into the juice below the test tube opening and the oxygen bubbles were allowed to enter the inverted test tube. When the desired oxygen level was reached, the vinyl tube was removed and the test tubes were capped off and dried. This process was repeated several times at varying volumes of oxygen. The test tubes were set in a rack to prevent them from being disturbed. The solutions were shaken every hour for nine hours, then were allowed to sit for five hours. They were then shaken every hour for another ten hours. After 24 hours, the test tubes were uncorked and the pH was measured immediately. The pH probe was calibrated before every use to ensure accurate readings. The data was recorded and analyzed.</p> <p>Results Overall, the control pH was higher in those solutions that were exposed to Oxygen levels for an extended period of time. This was due to the lower temperature and, because the function that the pH probe uses to measure pH is affected by temperature, the pH was measured a little high. However, after applying a pH temperature correction indicator, the pH of the control was 3.30. Therefore it can be assumed that the control was more acidic.</p> <p>Conclusions/Discussion Throughout the tests, there was doubt whether a closed system would affect the data. The pH did change in a small, increasing manner as a function of volume of oxygen exposure, which supported the hypothesis. The pH increased from 3.48 (average control) to 3.49 at 0% oxygen. From there it continued to increase to 3.53 (20%), 3.57 (40%), 3.61 (60%), and finally to 3.67 at 80% oxygen.</p>	
Summary Statement To determine the affect of oxygen exposure on the pH of orange juice.	
Help Received My father helped me obtain the materials needed for this project and helped add the oxygen to the test tubes.	