



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

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**Project Title**  
**The Effect of Brominated Vegetable Oil on Yeast Populations**

**Abstract**

**Objectives/Goals**  
Can bakers yeast of the species *Saccharomyces cerevisiae* respire, metabolize, and reproduce without an adverse effect in the presence of the amount of brominated vegetable oil (BVO) that is used in commercial drinks as an emulsifier, such as Orange Gatorade? If not, then it suggests that an alternative emulsifier should be used.

**Methods/Materials**  
Three individual yeast cultures were made: Active-Dry + Sucrose, Active-Dry + Gatorade Orange, Active-Dry + Gatorade Mango Extremo. I altered the type of nutrient given to the yeast cells (sucrose, Gatorade Orange, or Gatorade Mango Extremo - sucrose being the control; Orange has BVO, Mango lacks BVO) to test my hypothesis. An iodine-stained drop from each of the four cultures at 0 hours, 24 hours, 48 hours, 72 hours, and 96 hours was transferred into the wells of three KOVA Glasstic Slides, ruled in 1/2 mm squares. The number of cells in eight squares for each time period were counted under a microscope at 400x.

**Results**  
My data showed yeast cells exposed to the sucrose and Gatorade Mango Extremo started with about 200 cells and nearly doubled after 24 hours, then gradually began to decline until the population was virtually dead. Conversely, cells exposed to Gatorade Orange did not show this doubling period and only grew slightly, adding only about 30 cells to the original population size after 24 hours. After this, the population declined more rapidly than the other two yeast populations.

**Conclusions/Discussion**  
My objective was attained: the brominated vegetable oil in the commercial drink had an adverse effect on the yeast cells, in that stunted growth occurred compared to the populations not exposed to BVO (sucrose and Mango), due to the death of several cells from the increased amounts of bromine. This suggests that a natural emulsifier, such as those obtained from cellulose or Ester gum, should be used in place of BVO in commercial drinks. Also, the populations died off, rather than plateaued, because of the accumulation of ethanol, which becomes toxic to the yeast at increased levels, from anaerobic fermentation that the cells undergo.

**Summary Statement**  
This project is aimed to test if the brominated vegetable oil used in commercial drinks as an emulsifier is harmful to yeast cells, and therefore possibly harmful to humans, which may give reason to use an alternative natural emulsifier.

**Help Received**  
Recieved micrographs of slides at Anaheim Regional Medical Center from Dr. Welsh; Recieved advice on examining yeast cells under the microscope from Professor Suzanne Sandmeyer UCI School of Medicine via email; borrowed microscope from Paul Hunt, teacher of Biology at Villa Park High School.