



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

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Project Title The Effect of Vitamins, Minerals, and Iron on Ethanol Production	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to find out if adding vitamins, minerals, and iron to a sugar solution fermented by yeast would increase ethanol production. I thought that the container with the vitamins, minerals, and iron would have the most ethanol because it would have more nutrients to draw on.</p> <p>Methods/Materials First I sterilized all three 4.5 liter glass containers. Then I mixed the water, sugar, pectic enzyme, Camden tablets, and yeast nutrient together in an 18 liter stainless steel pot. I took a hydrometer reading of each container to measure the potential alcohol each week. The first glass container was my control and had no added vitamins, minerals, and iron. The solution in the second container consisted of vitamins, and the solution in the third container consisted of vitamins, minerals, and iron. I fixed an airlock to each container and took regular readings at week long intervals for five weeks.</p> <p>Results The results showed that the solution containing vitamins, minerals, and iron had the most rapid rate of fermentation. The solution with the vitamins had an initial fast rate of fermentation but slowed down in the end. Both the vitamin and iron and the vitamin had a faster rate of fermentation compared to the control.</p> <p>Conclusions/Discussion It is interesting that the vitamins and iron managed to keep a faster rate of fermentation as can be seen by the graph. This may indicate that iron contributes to fermentation. I think that the vitamins and the iron gave the yeast more nutrition so it performed better. The graph also shows that at the beginning the vitamins were a clear factor in this experiment but towards the end the rate of fermentation sharply declined. The control was slow but steady and did not decline as much as the others did. While collecting my initial research, I found that yeast consists of protein and B vitamins. Perhaps the additives which include B vitamins enhanced the rate of fermentation. My results could have possible implications for industrial ethanol production. Therefore, by adding vitamins, minerals and iron to the specialized enzymes, yeast fermentation may be more efficient. This could lead to positive economic consequences by making the production of ethanol increasingly more cost effective and therefore warrants further investigation.</p>	
Summary Statement My project was to investigate if adding vitamins, minerals, and iron to a sugar solution fermented by yeast would increase ethanol production and thereby making the process more cost effective.	
Help Received	