CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Cole R. Smith

Project Number
J1734

Project Title
The Acid Test: How Bacteria Growth Rates Are Affected by Various pH Levels Over Time

Abstract

Objectives/Goals
The objective is to determine at what pH the microorganism Escherichia coli (E. coli) grows best.

Methods/Materials
I used 8 flasks full of a 100ml liquid yeast formula in order to give the E. coli something to grow in. Each flask was at a different pH ranging from pH 5.0 through pH 8.5, increasing pH by 0.5 each time. I also used 8 separate agar dishes with pH levels 5.0 through 8.5, increasing by 0.5 pH in every dish. Each dish had about 50,000 separate E. coli organisms. The plates were left to incubate overnight, while the flasks were checked every 30 to 45 minutes by a spectrophotometer.

Results
E. coli in pH 6.0 through pH 8.0 had a higher growth rate compared to E. coli growing in pH 5.5 and below and pH. 8.5 and above. The alkaline groups had higher growth rates than the acids.

Conclusions/Discussion
The microorganism E.coli prefers growing in a rather neutral pH. There is a point in pH at which E. coli cannot grow easily which is any acid lower than pH 6.0 and anything more alkaline than pH 8.0. Certain organisms grow better in various pH levels; it is dependant on the organism and its adaptations and the environment they are naturally found in.

Summary Statement
An analysis of the rate of growth of bacteria in varying pH level solutions, using E. coli as test bacteria, with the goal of determining the optimal pH for the highest rate of growth.

Help Received
Used lab equipment at the University of California, Santa Barbara under the supervision of Dr. Stu Feinstein, Director of the Neuroscience Research Institute, UCSB