CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

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Project Number
J1420

Project Title
Are Yeast Cells Temperature Sensitive?

Abstract

Objectives/Goals
This research experiment was done to study the effect of different temperatures on the growth of yeast. Our goal was to determine at which temperatures do yeast cells grow the best at.

Methods/Materials
Yeast cultures were grown at 30°C in a water bath and their growth rate was measured in a time course experiment. New cultures were inoculated from this culture into a glucose plus sucrose growth medium. Five cultures were inoculated and placed at different temperatures as follows: 4°C, 10°C, 20°C, 30°C, and 40°C. Yeast cells were counted at zero time, sixteen hours, and twenty hours by taking a cell count using a hemocytometer. At the same times, the gas produced by the cells was measured by gas pressure sensors. Experiment was repeated and duplicate samples were used for both tests, and the data was recorded for analysis. Viability of yeast cells was confirmed by microscopic examination and methylene blue stain.

Materials used: 20 Pipettes; 2 packets of Red Star Yeast; 30 g of sucrose; 15 g of glucose; 11 flasks; 300 mL distilled water; 2 hemacytometers; 1 water bath; 1 refrigerator; 1 Vernier Gas Pressure sensor; 16 test tubes; 20 mL vegetable oil; Laptop computer; 1 Vernier interface; 15 Cover slips; 2 microscopes; 2 Stirring Rods; 1 microentrifuge.

Results
Our results showed that yeast cells gew the best at 30°C, followed by 20°C (room temperature). At extreme high and low temperatures (4°C and 40°C) the cells failed to grow. In addition to a reduced cell number and a slower rate of CO(2) gas productio, the cells also showed other changes at the extreme temperatures. At 10°C the cells clumped together, as observed from under the compound microscope. At 40°C most cells stopped dividing and died after 16 hours as indicated by methlyene blue analysis.

Conclusions/Discussion
According to the gas pressure and cell counts data from our experiment, yeast cells grew the best at 30°C followed by 20°C. There was minimum growth observed at 10°C and 40°C. No growth occurred at 40°C. Microscopic analysis showed that the cells clumped together at lower temperatures and died at high temperatures. So, our hypothesis was right, because the sample at 30°C had a better growth rate than all of the other samples.

Summary Statement
We studied the effect of different temperatures on the growth of yeast cells.

Help Received
Used the compound microscope, hemacytometer, and gas pressure sensors in Dr. Malhotra's lab at Thousand Oaks High School