CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
S1407

Project Title
Maximizing the Production of Ethanol from Corn Starch

Abstract

Objectives/Goals
The objective of this experiment was to increase the amount of starch broken down in fermentation to produce more ethanol through the use of enzymes

Methods/Materials
Glucoamylase
Alpha-amylase
Yeast
Insulated Cooler
Flasks
Pressure sensors
Hyrdometer

Flasks where filled with starch solution and variable enzyme and allowed to undergo fermentation for 23 hours. Change in specific gravity was measured with a hyrdometer and change in pressure with pressure sensors.

Results
After experimentation the combination of glucoamylase and alpha-amylase allowed yeast to utilize 47% of the starch. Glucoamylase itself converted 17% of the starch to sugar and Alpha-amylase converted 6% and the control group converted 2-3% average of the starch. Alpha-amylase increased pressure by average 32.34 kPa, 4ml glucoamylase by 79.57 kPa, 4ml of both by 93.42 kPa. control average change in pressure of 8.46 kPa.

Conclusions/Discussion
Enzymes greatly increase the productivity of fermentation. Alpha-amylase breaks apart complex starch bonds, Glucoamylase breaks apart only the end polymers of starch quickly into maltose. The combination of these two produce the greatest results. Other sugar sources can be used instead of starch, including sugar cane, beets, and wheat.Changes to my experimentation method would include using a larger flask and increasing the density of the sugar mass to produce greater amounts of alcohol. Future research into the conversion of biomass into ethanol also seems possible.

Summary Statement
Increasing ethanol production in the fermentation of corn

Help Received
No significant help recieved