

Saccharification of Edamame Pods for Bioethanol Production

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1 Abstract

Our goal was to create bioethanol from Edamame pods. We mixed powdered Edamame pods and cellulase enzyme and measured the glucose content. We used alcoholic fermentation to confirm ethanol presence based on the volume of carbon dioxide generated. Overall, we successfully created bioethanol from the saccharification samples.

2 Introduction

In recent years, bioethanol has attracted attention as a carbon-neutral fuel. However, conventional bioethanol is often produced from raw materials, which has competition with food resources. In this context, we focused on Edamame pods, which have a high disposal rate, but a large cellulose component. Cellulose can be separated to produce glucose. When glucose undergoes alcoholic fermentation, ethanol, which can be used as a fuel, is produced.

3 Theory and Experiment

We tried to determine whether the cellulose in Edamame pods can be decomposed using enzymes. We mixed powder of Edamame pods and cellulase enzyme and measured the glucose content.

We also aimed to determine whether the glucose produced in experiments was indeed glucose. To do this, we used alcoholic fermentation and measured the amount of glucose present based on the volume of carbon dioxide generated.

4 Results

On the first day, the glucose concentration of all samples was the same.

However, from the second day onward, only the samples containing Edamame powder showed an increase in glucose concentration.

The saccharified sample generated more than twice as much carbon dioxide as the non-saccharified sample. This difference in carbon dioxide production likely corresponds to the 1% difference in glucose concentration.

5 Conclusion

Overall, we confirmed that using liquid enzymes allows the production of glucose from powdered Edamame pods and verified that glucose was indeed produced by using alcoholic fermentation.

6 References

- Measuring Glucose Concentration Using Alcohol Fermentation Ehime Prefectural Uwajima Higashi High School
- Biology Chapter 3 'Metabolism' Suken Publishing
- Food Ingredient Database Vegetables / Edamame