

How Five Different Types of Sugars Affect Yeast Fermentation Rate

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Abstract

Data was collected to see the effects different types of 20% sugar solutions have on the fermentation rate of yeast. Our initial hypothesis was that non processed sugar would ferment at a lower rate than the processed sugar. The results from our experiments do not support this hypothesis because the fermentation rates were consistent between the non-processed and processed samples. The valuable information which can be gathered from this experiment is that processed sugar is useful for rapidly producing CO₂ bubbles during the fermentation process of yeast.

Introduction

Fermentation is an essential process for baking and brewing. It is because of yeast fermentation we have bread and beer which have fed humans for generations. Based on other research, we know that certain sugars are more favorable for fermenting yeast (Oculyze, 2003). Additionally, research has shown that different types of sugars produce varying effects on the fermentation rate (Pepin and Marcazzo, 2015). Our group wanted to know whether processed or unprocessed sugar would affect the rate at which yeast produces CO₂. After much debating, our question was How 20% of 5 different sugars affect the fermentation of 5 g of Red Star yeast. Our hypothesis was that the processed sugar would ferment at a higher rate than the non processed sugars.

Methods

Materials & Location

To start, we gathered 5 different types of sugar (Jaggery, Non-Processed Beet Sugar, Cane Sugar, Agave, and Sweet N' Low) then mixed those into 20% solution. 5 test tubes each held 10 ml of yeast and 10 ml of one sugar solution. Each was placed in a fermentation tube, then put into an incubator. Our data was collected in the lab classroom over the course of 2 weeks.

Procedure

In each of the 5 test tubes, 10ml of yeast and 10ml of one sugar was mixed together before being placed in a fermentation tube. Our group then waited on average 20 mins before checking to see if they had fermented. Afterwards, we recorded the amount of CO₂ bubbles produced to calculate the fermentation rate.

Discussion

Through 5 experiments, our results found that the non-processed sugar fermented at the same rate as a majority of the processed sugars. While the first experiment is inconclusive for two of the Cane and Agave sugars, the subsequent 4 experiments showcase a similarity in Co₂ levels. In those tests, the Non-processed beet sugar used to compare with the others had similar fermentation rates as the Jaggery and Agave.

Our study could have benefitted from more non-processed sugars being tested as the 1 to 4 ratio only allows us to assess the fermentation of one type. The reason this would have yielded more diverse results is due to the ease that processed sugar is broken down in yeast (Oculyze, 2003). Additionally, our first experiment had yielded incredibly rapid fermentation rate at only 20 mins while the other fermented slower and took on average 30 mins. While the non-processed beet sugar did not ever have the higher fermentation rate it did not have the lowest out of every experiment.

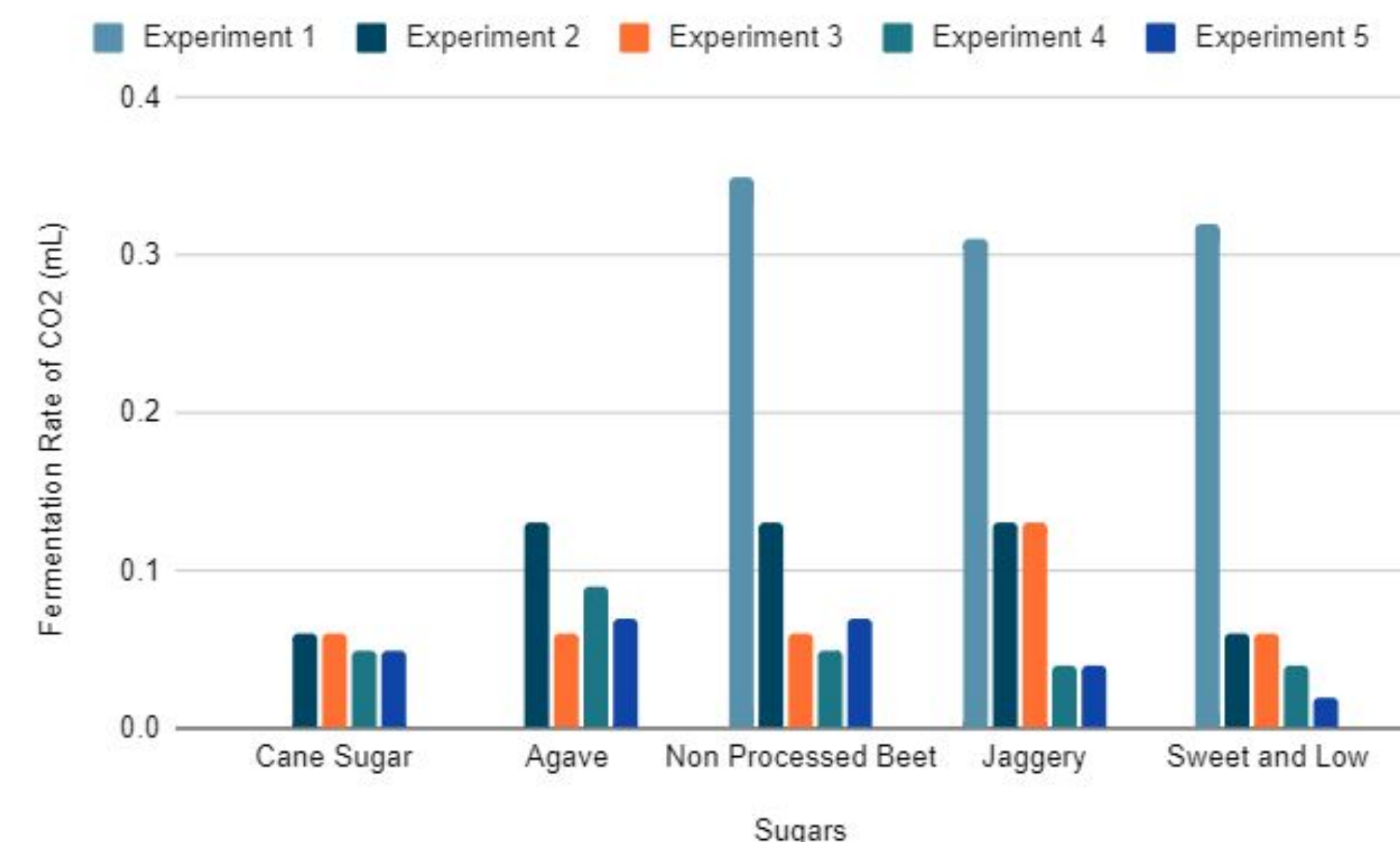
Overall, our experiment can confidently conclude that it is undetermined if non-processed sugar ferments at a lower rate than processed sugars although through more diverse sample groups and more ensuring that they are all kept at a consistent temperature will ensure more accurate results.

Fermentation of CO₂

	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5
Cane Sugar	Undetermined	0.06 mL	0.06 mL	0.05 mL	0.05 mL
Agave	Undetermined	0.13 mL	0.06 mL	0.09 mL	0.07 mL
Non Processed Beet	0.35 mL	0.13 mL	0.06 mL	0.05 mL	0.07 mL
Jaggery	0.31 mL	0.13 mL	0.13 mL	0.04 mL	0.04 mL
Sweet and Low	0.32 mL	0.06 mL	0.06 mL	0.04 mL	0.02 mL

Table 1. States the Fermentation Rate of CO₂ in each experiment. The first experiment resulted with Cane Sugar and Agave Sugars fermentation exceeding the 10mL line ending in undetermined results.

Fermentation Rates



Graph 1: Shows the Fermentation rate of CO₂ for each type of sugar.

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