



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Katherine N. Jabba	Project Number J0511
Project Title What's Finer? Refined or Unrefined Sugar? The Effect of Sugar Type in the Yeast Metabolism Process	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Yeast is used in bread-making. For yeast to produce carbon dioxide, it must be mixed with sugar and water. The objective is to determine if the type of sugar has an effect on the amount of carbon dioxide the yeast produce. The experiments were conducted in two phases. The Phase 1 hypothesis was to determine if unrefined sugar would produce more carbon dioxide in 20 minutes. For Phase 2, the experiment was conducted for 2 hour duration to determine if the rate of carbon dioxide production would change over a longer time period.</p> <p>Methods/Materials This project tested refined (granulated) sugar, and unrefined (turbinado) sugar mixture. As a control, yeast and water with no sugar was tested. An apparatus was built using a reaction vessel to hold the mixture of yeast, sugar and water, an aerator pump to aerate the yeast-sugar-water mixture, an inverted cylinder to measure the amount of carbon dioxide produced, and tubing to connect the apparatus parts.</p> <p>Results In Phase 1, the unrefined sugar produced twice as much carbon dioxide. In Phase 2, the refined sugar produced 198 more milliliters of carbon dioxide than the unrefined sugar in two hours, about 10% more. The experiment also proved that the yeast does not produce carbon dioxide without sugar.</p> <p>Conclusions/Discussion The results of the Phase 1 experiment supported the hypothesis, but the results of Phase 2 experiment did not support the hypothesis. The refined sugar produced about 10% more carbon dioxide consistently throughout the two hour testing period during Phase 2. The reason for the result variation between the phases of experimentation is unknown but could be due to a batch variation between bags of unrefined sugar. This information can be used to determine the preferred type of sugar for bread-making.</p>	
Summary Statement This project compares the amount of carbon dioxide produced by refined (granulated) sugar and unrefined (turbinado) sugar in the yeast metabolism process.	
Help Received My father, Ronald Jabba, assisted me in setting up the apparatus and proofreading my report. He also allowed me to use the aerator pump and thermometer from his laboratory at work. My science teacher, Mrs. Toegemann, assisted me in finding a project topic and guiding me through the scientific method	