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|  | **The Wonderful World of Yeast**  Yeasts are unicellular, asexual, ascomycete, primitive fungi. While there are over 350 species of different yeasts, a particular genre of yeasts *(Saccharomyces cerevisiae),* have been influential on the human pallate. Throughout history, the ability of this fungus to break down glucose and produce ethanol and carbon dioxide has been utilized by mankind in the manufacture of many food products, such as bread, beer, and wine. Naturally occuring yeasts were the first to break down the sugars in grapes and produce the first wines. In modern days, these yeasts have been domesticated and purified for efficiency.  *S. cerevisae - Michael A McClure Ph.D.,*  However, these yeast Saccharomyces cerevisiae has been speculated to have it's growth impeded by pressure. Dr. Koki Horikoshi of the Japan Marine Science and Technology Center tested the yeast Saccharomyces cerevisiae under hydrostatic pressure, using 6-carboxyflourescein as a tester of the pH inside the yeast cells. Dr. Horikoshi observed that, under pressure, the cytoplasm inside Saccharomyces cerevisiae tends to become acidic, possibly impeding the fermentation action of the yeast.  **The Process of Fermentation**  Saccharomyces cerevisiae begins fermentation with the basic ingredient of a simple sugar. This simple sugar may range from the starch in potatoes to the sugars in honey. The yeast enzyme zymase then reacts to the sugars and the end products of ethanol and carbon dioxide are produced. This fermentation is represented by the following equation:  C6H12O6 �� 2C2H5OH + 2CO2  (glucose) �� 2 (ethanol) + 2 (carbon dioxide)  However, real world results are not as simple. Due to the difficulty of obtaining pure Saccharomyces cerevisiae, the impure yeast cultures may produce variable amounts of other substances, such as fusel oil, glycerin, and other organic acids.  **The Test**  For the test, we chose to use honey as our sugar. The honey was diluted in distilled water by warming at a combination of .4879L water (16.5 oz) and .1774L Honey (6.0 oz). We also obtained a relatively pure sample of Saccharomyces cerevisiae for the experiments. All the sample containers used were Ziploc-brand bags, and each contained an equal amount of all solutions. In the pre-test, we had tested various containers for the substances, from melting the top of a plastic bag shut to different brands of slide and seal bags. However, we found that the Ziploc-brand bags provided a better seal and better for the purposes of our experiemnt.  The Ziploc-brand bags were then each filled with a combination of the Honey mixture and Saccharomyces cerevisiae yeast. Each bag contained .05L honey mix and 5g of yeast.  Each of the bags was placed into a heavy duty aerosol can and sealed shut. With the aerosol can sealed, we proceeded to pressurize the experimental units with either Nitrogen gas or Carbon gas. The selection of gases was decided upon to lower the possibility that the type of gas may somehow skew results.   |  |  |  |  | | --- | --- | --- | --- | |  | Control | Lo Pressure | High Pressure | | Nitrogen | 0 psi | 60 psi | 120 psi | | Carbon Dioxide | 0 psi | 60/70 psi | 120/135 psi |   Each type of combination was done in triplet, and all conatiners were stored in a water cooler, whose 24 hour temperature range maintained between 18.0� and 21.5� celsius.  Over an approximately 3 week period, the containers were kept in the water cooler, and the pressure inside them monitored daily with a pressure gauge.  *S. cerevisiae - Bloom Lab*  **Past Experiments of the same Nature**  Experiments done in the past to observe, specifically the effects of different types of pressure on Saccharmomyces cerevisiae are limited. The aforementioned project by Dr. Koki Horikoshi is one of the most detailed tests, but the Doctor only tested to see if the cells of the yeast would alter in some way that may explain why it was true, but did not go into long term studies with yeast constantly under hydrostatic pressure to see their results.  Many organizations have been studying the genetics of Saccharomyces cerevisiae on a genetic level. The entire of it's genetic sequencing has been mapped out and is available for public use. Stanford University also sponsors the [Saccharomyces Gemonic Database](http://genome-www.stanford.edu/Saccharomyces/), which is an informational guide of experiments on the yeast that have dealt with mapping it's genomes.  This Page is Best Viewed with Thousands of Colors  For More Information about these Projects, Please Contact [Eric Thiel.](mailto:ethiel@pleasanton.k12.ca.us) |