LAB 8B:
EFFECTS OF VARIOUS CARBOHYDRATES ON FERMENTATION

By: Billy Bob Joe
Student No. 416 905 647
Lab Section: 0123
T.A: Baby Getdown
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Purpose:

To determine the ability of yeast to use different carbohydrate sources as a substrate for fermentation by measuring the release of carbon dioxide.

Materials and Methods:

The procedures and materials used in this experiment can be found on page 175-176 of the *Introductory Biology Part I Laboratory Manual* by Dr. Clare Hasenkampf and Mary Olaveson (2003).

Results:

From the experimental data obtained, it was found that Solution 1 (10mL of distilled H₂O and 30mL of 10% glucose) had released the greatest amount of CO₂ gas, approximately 15800 mm³ (Figure 1.0). Whereas Solution 2 had released no volume of gas, or the released amount volume was too small to be read on the scale. Solution 3, which had 30mL of 1% starch solution and 10mL of 0.5% of amylase had released the second greatest volume of CO₂ gas, 12900 mm³ (Figure 1.0).
Conclusion:

From this experiment it can be concluded that a solution containing glucose will yield the most volume of CO2 gas in alcohol fermentation, and thus yield the most ATP. Therefore this solution has the greatest fermentation rate. Other carbohydrate sources acting as a substrate will take longer to yield little amounts of ATP or will not result in any ATP at all. Thus, other carbohydrates sources will take longer to produce little amount CO2 gas or will not produced any volume of CO2 gas. This was shown in the experiment, where the greatest amount CO2 gas accumulated in the tail portion of the fermentation tube containing glucose (Solution 1). In contrast, the other solutions did not yield much CO2 in the tail portion of the tube. This was due the fact that other solutions contained starch. Starch is a polymer of glucose or a polysaccharide that needs to be broken down into its glucose monomer units before acting as a substrate. So without anything to breakdown the polymer, a solution of just starch will yield lowest amount of CO2 gas (Solution 2). However, if a starch solution had an enzyme such as amylase, which breaks down polysaccharides into monomers of glucose, then this glucose can also act as a substrate. However, this solution containing amylase and starch (Solutions 3) will not release much CO2 as a solution of just glucose because it takes some time for the enzyme amylase to break down the polysaccharide. Thus fermentation rate is slowed. Therefore just glucose alone is the best source as a substrate for alcohol fermentation.