Sweet Success: Fueling our Future with Fermentation

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With increasing populations and vehicle traffic and limited crude oil supplies, alternative sources of fuel will be needed. Bio-energy sources have seen development with the use of corn to produce ethanol. Ethanol production from corn is somewhat limited by the market pricing of corn. Agriculture by-products such as switch grass or straw may be a more cost-effective source if they can be proven to be adequate sources of ethanol. Data collection was set for 1 sample every 10 seconds for 900 seconds for both the carbon dioxide and ethanol sensor. Five percent sugar solutions are prepared for glucose, sucrose, lactose, fructose, and maltose. 250 milliliters of 40 degree C water will be added and stirred on medium speed. 12.5 grams of one of the sugars will be added and allowed to dissolve then 3.5 grams of dry active baker’s yeast will be added. The Biochamber cleaned and dried. Ethanol and carbon dioxide sensors need to equilibrate to room air for 5 minutes. I performed linear regression with a scatter plot of the data with a linear regression line. The Maximum ethanol/CO2 production can be determined using Max calculation in Excel. Two disaccharides, maltose and sucrose, had substantially higher fermentation rates for both carbon dioxide and ethanol. When comparing the maximum ethanol and carbon dioxide production, Maltose had a substantially higher production measured in parts per million compared to the other sugars.. My findings indicate a distinct opportunity to produce ethanol from fermentation of maltose derived from agricultural by-products.

Awards Won: