

Bioreactor Kinetics

May 2, 2006

TO: Engineering Development Branch

FROM: Engineering Division

SUBJECT: Bioreactor Kinetics

Our company has been asked to test a certain yeast strain (*saccharomyces cerevisiae*) for general use in an organic ethanol production facility. Ethanol can be produced by fermentation of glucose by yeast when in an anaerobic environment. A small amount of yeast can be cultivated in a reactor to quickly increase the cell mass under aerobic conditions. The increased cell mass can then be sent to a second reactor for ethanol production.

Use the company's bioreactor to test the yeast strain in aerobic conditions. Please determine the following parameters for this yeast: gas-liquid mass transfer coefficient, specific cell growth rate, specific cell respiration rate, and specific glucose uptake rate. The experiment works much better if fresh yeast is used.

There are several references in the company's library that might be beneficial (see below) and a copy of a Cornell experiment (first reference) is attached.

References:

Shuler, M.L., N. Mufti, M. Donaldson, and R. Taticek, "A Bioreactor Experiment for the Senior Laboratory," Chemical Engineering Education, Winter 1994.

Wang, D.I.C., "Fermentation and Enzyme Technology".

Shuler, M.L., "Bioprocess Engineering" in Encyclopedia of Physical Science and Technology, Vol. 2

Bailey, J.E., "Biochemical Engineering Fundamentals"