ETHANOL PRODUCTION FROM RICE STRAW HYDROLYSATE BY IMMOBILIZED RECOMBINANT *Zymomonas mobilis* IN A FLUIDIZED-BED REACTOR*

Nhuan P. Nghiem[1**], Michael A. Fatigati[2], Brian H. Davison[1], Timothy M. Cofer[3] and Darilyn D. Planas[4]

[1]Chemical Technology Division
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, Tennessee 37831

[2]Arkenol, Mission Viejo, CA 92691

[3]Tennessee technological University, Cookville, TN 38501

[4]Polytechnic University of Puerto Rico, Hato Rey, PC 00919

for Presentation at

Pacific Chemical 2000
Honolulu, Hawaii
December 15-19, 2000

"The submitted manuscript has been authored by a contractor of the U.S. Government under contract DE-AC05-00OR22725. Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes."

* Research supported by Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725.

** To whom all correspondence should be addressed.

ETHANOL PRODUCTION FROM RICE STRAW HYDROLYSATE BY IMMOBILIZED RECOMBINANT *Zymomonas mobilis* IN A FLUIDIZED-BED REACTOR*

Nhuan P. Nghiem[1**], Michael A. Fatigati[2], Brian H. Davison[1], Timothy M. Cofer[3] and Darilyn D. Planas[4]

[1]Chemical Technology Division
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, Tennessee 37831

[2]Arkenol, Mission Viejo, CA 92691

[3]Tennessee technological University, Cookville, TN 38501

[4]Polytechnic University of Puerto Rico, Hato Rey, PC 00919

ABSTRACT

Rice straw is an agricultural waste product, which is available in large quantities in the United States. Arkenol's patented concentrated sulfuric acid process was used to hydrolyze this lignocellulosic waste to a solution of glucose and xylose. The mass ratio of glucose:xylose in the hydrolysate was 4:1. Immobilized cells of the recombinant strain *Zymomonas mobilis* ATCC 31821(pZB5) with capability of metabolizing both five- and six-carbon sugars were used to ferment the hydrolysate to ethanol. Comparison of results obtained in batch experiments using synthetic sugar solutions and the hydrolysate indicated that the hydrolysate was not inhibitory to ethanol production. Continuous experiments using this hydrolysate then were performed in a fluidized-bed reactor. The experiments were performed at 30°C and pH 5.5. The effects of sugar concentrations and residence time on ethanol yield and productivity were studied. The results of these continuous experiments will be discussed.

* Research supported by Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725.

** To whom all correspondence should be addressed.