BIOFUEL PRODUCTION FROM STEAM EXPLOSION PREPREATED BIOMASS

Romaní, Aloia[1]; Peleteiro Susana[2]; Garrote, Gil[2*]; Ballesteros, Ignacio[3], Ballesteros, Mercedes[3] and Parajó, Juan Carlos[2]

[1]Biological Engineering Center (CEB), Campus Gualtar, University of Minho, Portugal.

[2]Chemical Engineering Department, Science Faculty, Campus Ourense, University of Vigo, Spain

[3]Renewable Energies Department, CIEMAT, Research Centre for Energy, Environment and Technology, Madrid, Spain

Phone: +34988387075, Fax: +34988387001, e-mail: gil@uvigo.es

Scientific topic: 2. Chemical Engineering for Sustainable Development. 2.1. Natural Resources Sustainability

INTRODUCTION

The prices of fossil fuels have increased in the last decade so that the interest for search of renewable energy sources has grown notably. The bioethanol from lignocellulosic materials (LCMs) can be an interesting alternative to fossil fuels. The *Eucalyptus globulus* wood (EGW) is a LCM suitable for the ethanol production from cellulosic fraction. The second generation bioethanol is obtained by three main steps: i) pretreatment; ii) saccharification and iii) fermentation.

MATERIALS AND METHODS

The EGW was submitted to steam explosion treatment in order to alter the structure of LCM and improve the enzymatic accessibility. The pre-treatment was carried out in a steam explosion prototype at T = 210ºC during 10 min. The solid treated was employed as substrate in a simultaneous saccharification and fermentation assays using an orbital shaker (100 rpm) at 35ºC and pH = 5. A factorial design of 3 factors and 2 levels (3^2) was carried out to study the influence of Liquid Solid Ratio (4-16 g/g) and Enzyme Substrate Ratio (4-16 FPU/g). The used enzymes were Celluclast 1.5 and Novozymes 188N, provided kindly for Novozymes. The yeast *Saccharomyces cerevisiae* (CECT-1170) was used to fermentation the released glucose.

RESULTS

The treated solid was composed of 68% of cellulose, 2.8% of xylan and 30% of lignin. The cellulose recovery was of 97% (g cellulose/100g cellulose of raw material) and solubilisation of xylan was of 90%, mainly composed of xylose and xylooligosacarides (9.7 and 12.5 g/L, respectively). The variable more influential was Liquid Solid Ratio. The maximum ethanol concentration was 69 g/L (corresponding to ethanol yield of 83%) under conditions Liquid Solid Ratio 4g/g and Enzyme Substrate Ratio 16 FPU/g.

BOOK OF ABSTRACTS

SEQUI
SOCIEDAD ESPAÑOLA DE QUÍMICA INDUSTRIAL E INGENIERÍA QUÍMICA

EXPOQUIMIA
Encuentro Internacional de la Química
www.expoquimia.com

Fira Barcelona