

# Production of Glucose Syrup and Bioethanol from Broomcorn Via Enzymatic Hydrolysis and its Simulation by Artificial Neural Network

A. H. Ghorban Farahi, Gh. D. Najafpour\*, A. A. Ghoreishi,  
M. Narimani, M. masomi, M. Esfahanian  
Chemical Engineering Department, Babol University, Babol , Iran  
Email: najafpour@nit.ac.ir

## Abstract

Grain sorghum is one species of sorghum plant. This plant is used for preparation of brooms. In a sequence of pretreatment; first the seeds (broomcorn seed) are separated from the stems. After making broom, some seeds are remained as surplus, some of them are used as animal feed stocks and the remaining burned. The primary raw material in this project is considered as waste material. This plant has many species: grassy, sweet and grain sorghum. In this article grain sorghum's seeds (broomcorn) are used for production of syrup. Starch is the main source of stored carbohydrates in the broomcorn seed. It constitutes about 70-75% of broomcorn's weight. It is used as substrate for hydrolysis and producing syrup. After pretreatment and elimination of protein inhibitor, enzymatic hydrolysis of starch in broomcorn was investigated. For this purpose, dual enzymes, alpha amylase and amyloglucosidase were used. For finding optimum conditions of hydrolysis, RSM technique and (DESIGN EXPERT) software were used. This software was able to model enzymatic hydrolysis of broomcorn and predicts optimum conditions. The effect of parameters on enzyme hydrolysis was investigated and optimized. The amount of sorghum grains and the enzymes were applied. In addition after optimization, production of reducing sugars from broomcorn was simulated by Artificial Neural Network. Amount of sorghum and alpha amylase and amyloglucosidase were considered as input of artificial neural network and amount of produced sugars was considered as output of neural network. The number of passage, hidden layers and Neron in each hidden layer of neural network was optimized for convergence of the best operation. According to acquired results, a desirable accommodation was produced between experimental data and predicted amount. Therefore neural network was used as a powerful tool for simulating the present process.

**Keywords:** Broomcorn; Enzymatic Hydrolysis; Glucose Syrup; Artificial Neural Network



## A Review on Application of Combinatorial Catalysis Methods in Heterogeneous Catalysts Design

S. R. Nabavi<sup>1\*</sup>, T. Mahmoudi badiki<sup>2</sup>, A. Niaei<sup>2</sup>

1- Department of Applied Chemistry, University of Mazandaran, Babolsar, Iran

2- Department of Applied Chemistry and Chemical Engineering, University of Tabriz, Tabriz, Iran

Email: srnabavi@umz.ac.ir

## Abstract

The widespread and daily increasing application of heterogeneous catalysts in the industry has caused to using new techniques in catalysts design for reducing costs and accelerating research, development and commercialization. The application of combinatorial catalysis methods as new techniques in catalysts design are under development. At this paper, combinatorial catalysis methods including of experimental design, genetic algorithm and meta-modeling has been reviewed.

**Keywords:** Design of Heterogeneous Catalysts, Experimental Design and Analysis of Experiments, Genetic Algorithm, Artificial Neural Networks