عنوان مقاله:

Composite Multi Wall Carbon Nano Tube Polydimethylsiloxane Membrane Bioreactor for Enhanced Bioethanol Production from Broomcorn Seeds

محل انتشار:

ماهنامه بین المللی مهندسی, دوره 31, شماره 4 (سال: 1397)

تعداد صفحات اصل مقاله: 8

نویسندگان:

Ali Asghar Ghoreyshi - *Chemical Eng., Babol Nooshirvani University of Technology*

Amirhossein Farahi - *Chemical Eng., Noshirvani University of Technology*

Ghasem Najafpour - *Biochemical & Chemical Engineering, Noshirvani University of Technology, Babol*

خلاصه مقاله:

Broomcorn seed (Sorghum vulgare) was used as raw material for bioethanol production. Optimum conditions were obtained from response surface method. Broomcorn seed flour (45 g/l) was treated by alkaline treatment and dual enzymatic hydrolysis (0.7 g/l of α- amylase and 0.42 g/l of amyloglucosidase). The hydrolyzed total sugar of 25.5 g/L was used in conventional bioethanol production (8.1 g/l) using Saccharomyces cerevisiae. Enhanced bioethanol production was performed in membrane bioreactor (MBR) in integrated batch fermentation and membrane pervaporation process. Application of commercial polydimethylsiloxane/polyethyleneterephthalate/polyimide (PDMS/PET/PI) membrane in MBR resulted in ethanol concentration of 10.15 g/l in broth and 70.2 g/l in cold trap of MBR. Cell concentration in broth was increased from 7.2 in conventional fermentation to 9.05 g/l in MBR. In addition, ethanol production in MBR using fabricated membrane having ethanol separation factor of 8.7; ethanol concentration in broth and cold trap were 11.1 and 88.5 g/ l, respectively. Also the cell concentration of 10.2 g/l was obtained in MBR with fabricated membrane. In MBR, surface modified multi wall carbon nano tube (MWCNT) coated on membrane having ethanol separation factor of 10.2, resulted ethanol concentration of 11.9 and 110 g/l in broth and cold trap, respectively. Finally, for MBR using modified membrane the cell concentration of 11.01 g/l was obtained. Based on a comparison study, maximum ethanol separation and yield were obtained for modified membrane having MWCNT and the surface was modified by corona treatment.

کلمات کلیدی:

Bioethanol, Multi Walled Carbon Nano Tube, Polydimethylsiloxane, Polyethersulfune, Composite Membrane, Broomcorn Seed