World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:12, No:09, 2018

Optimization of Tangential Flow Filtration Process for Purifying DNA Vaccine

Authors : Piyakajornkul T., Noppiboon S., Hochareon L., Kitsubun P.

Abstract : Nowadays, DNA vaccines become an interesting subject in the third vaccine generation. The platform of DNA vaccines production has been developed and its downstream process becomes challenging due to the quality of the products in terms of purity and percentage of supercoiled DNA. To overcome these challenges, tangential flow filtration (TFF), which is involved in the purification process, could be used since it provides effective separation of impurity prior to performing further purification steps. However, operating conditions of TFF is varied based on several factors such as sizes of target particle and impurities, a concentration of solution as well as a concentration polarization on the membrane surface. In this study, pVAX1/lacZ was used as a model of TFF optimization in order to prevent a concentration polarization that can lead to the membrane fouling and also minimize a diafiltration volume while maintaining the maximum permeate flux resulting in proper operating times and buffer volume. By using trans membrane pressure (TMP) excursion method, feed flow rates and TMP were varied. The results showed a correlation of permeate flux with TMP where the maximum volume concentration factor reached 2.5 times of the initial volume when feed flow rate and TMP were 7 liters/m^2/min and 1 bar, respectively. It was optimal operating conditions before TFF system undergone pressure independent regime. In addition, the diafiltration volume was 14 times of the concentrated volume prior to performing a further anion chromatography process.

Keywords : concentration polarization, DNA vaccines, optimization, permeate flux, pressure dependent, tangential flow filtration (TFF), trans membrane pressure (TMP)
Conference Title : ICBEB 2018 : International Conference on Bioprocess Engineering in Biotechnology
Conference Location : Singapore, Singapore
Conference Dates : September 10-11, 2018