SCALE-UP OF CYCLODEXTRINS PRODUCTION FROM ARROWROOT STARCH

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ABSTRACT
Cyclodextrins are one type of modified starch that is widely used by various industries. This study was aimed to produce cyclodextrin in a pilot scale (25 liter) based on laboratory experiment result. Methods used to scaling up production of cyclodextrin is a similar geometry and analysis dimensional. The pilot reactor was constructed having volume of 25 liters is high tank 323 mm, impeller diameter of 200 mm, diameter tank 370 mm, the liquid height 233 mm, impeller speed 140 rpm, and the power to encourage impeller $7 \times 10^{-7}$ Hp. The power to encourage impeller in pilot scale have increased fifteen times from that laboratory scale. Cyclodextrins are produced, analyzed starting from the yield, density, viscosity, and composition. Results of analysis showed that pilot scale could mantained the level of productivity and quality of cyclodextrin with yield 72 g/L, density $1.045 \times 10^3$ kg/m$^3$, a viscosity 4 cP, and the composition is 39.27% $\alpha$-cyclodextrin and 32.05% $\beta$-cyclodextrin. Financial feasibility analysis of the production Cyclodextrin on the reactors scale 25 litre result that IRR 24%, BEP 101.7 kg of cyclodextrin, or Rp 14,242,928, NPV (14%) Rp 5,570,161, PBP 2.74 years, and Net B / C Ratio 1.26. These results indicated that the cyclodextrin industry with scale of 25 liters financially feasible to implement.

Keyword: arrowroot starch, cyclodextrin, scale-up