Critical review of membrane bioreactor system used for continuous production of hydrolyzed starch

Abstract

Recent developments of the starch hydrolysis have concentrated on continuous production of hydrolyzed starch, combination with the secondary processes that requires hydrolyzed starch as the raw material, and newly developed materials such as thermo-stable enzymes, and membrane applications as well. In continuous recycle membrane bioreactor systems (CRMR), thermo-stable α-amylase enzymes have to be used if simultaneous hydrolysis to be applicable. The CRMRs also require a pre-hydrolysis stage, and also the starch milk mass fraction is limited to about w = 10 %, thus reducing viscosity and avoiding overloading which causes heavy fouling to the membrane. High temperatures are also restricted to the used of membrane materials. The other problems are accumulation of higher molecular mass of oligosaccharides in the recirculation system, and inactivated enzymes. In this paper, these problems have been discussed for process flexibilities and system improvements for certain applications are given.