Abstract
L-Lactic acid was produced from raw cassava starch, by simultaneous enzyme production, starch saccharification and fermentation in a circulating loop bioreactor with Aspergillus awamori and Lactococcus lactis spp. lactis immobilized in loofa sponge. A. awamori was immobilized directly in cylindrical loofa sponge while the L. lactis was immobilized in a loofa sponge alginate gel cube. In the loofa sponge alginate gel cube, the sponge serves as skeletal support for the gel with the cells. The alginate gel formed a hard outer layer covering the soft porous gel inside. By controlling the rate and frequency of broth circulation between the riser and downcomer columns, the riser could be maintained under aerobic condition while the downcomer was under anaerobic condition. Repeated fed-batch L-lactic acid production was performed for more than 400 h and the average lactic acid yield and productivity from raw cassava starch were 0.76 g lactic acid g(-1) starch and 1.6 g lactic acid l(-1) h(-1), respectively.