Influence of Hydraulic Retention Time on Start-Up and Process Stability of Polyurethane Carrier Reactions

Author(s)

M. S. T. Rubindamayugi, H. J. M. Op Den Camp, H. J. Lubberding, H. J. Gijzen, G. D. Vogels

Abstract

Influence of hydraulic retention time (HRT) on start-up of Polyurethane Carrier Reactors treating Volatile Fatty Acids (VFA) based wastewater, at constant organic loading rate (OLR) was investigated. OLR was increased stepwise after start-up to evaluate the influence of HRT on process stability. Four parallel experiements were conducted at HRTs of 48, 24, 18 and 12 hours. Results indicate an influence of HRT on duration of start-up period, and process stability after start-up. The reactor operating at HRT of 24 hours required only a relatively stort start-up period and showed higher process stability under steady-state condition. Analysis of individual VFA degradation indicated that butyrate and propionate consuming acetogenic bacteria increased in sigmoid fashion during start-up. Changes in acetate degradation do not show the true increase of acetoclastic population. Instead they reflect concomitant activity of VFA catabolizing acetogens and aceloclastic methanogens . Immobilized biomass increased exponentially during the first three weeks of start-up. The differences in start-up periods between reactors was probably due to differences in quality and activity of biomass immobilized at different HRTs. The HRT of 24 hours was most optimal to obtain stable reactor performance within a short startup period.