

Concentration of Waste Waters by Enzyme-Assisted Low-Temperature Evaporation

Authors : Ahokas Mikko, Taskila Sanna, Varrio Kalle, Tanskanen Juha

Abstract : The present research aimed at the development of an energy efficient process for the concentration of starchy waste waters. The selected principle is mechanical vapor recompression evaporation (MVR) which leads to concentrated solid material and evaporated water phase. Evaporation removes water until a certain viscosity limit is reached. Materials with high viscosity cannot be concentrated using standard evaporators due to limitations of pumps and other constraints, such as wetting. Control of viscosity is thus essential for efficient evaporation. This applies especially to fluids in which due starch or other compounds the viscosity tends to increase via removal of water. In the present research, the effect of enzymes on evaporation of highly viscous starch industry waste waters was investigated. Wastewater samples were received from starch industry at pH of 4.8. Response surface methodology (RSM) was applied for the investigation of factor effects on the behaviour of concentrate during evaporation. The RSM was prepared using quadratic face-centered central composite design (CCF). The evaporation performance was evaluated by monitoring the viscosity of fluid during processing. Based on viscosity curves, the addition of glucoamylase reduced the viscosity during evaporation. This assumption was confirmed by CCF, suggesting that the use of starch decomposing glucoamylase allowed evaporation of the starchy wastewater to a relatively high total solid concentration without a detrimental increase in the viscosity. The results suggest that use of enzymes for reduction of viscosity during the evaporation allows more effective concentration of the wastewater and thereby recovery of potable water.

Keywords : viscous, wastewater, treatment, evaporation, concentration

Conference Title : ICSEWQSWM 2017 : International Conference on Sanitary Engineering, Water Quality and Solid Waste Management

Conference Location : Havana, Cuba

Conference Dates : November 23-24, 2017