Removal of volatile fatty acid in landfill leachate by the microwave-hydrothermal method

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Received 11 July 2012; Accepted 24 April 2013

ABSTRACT

In this study, we report on the rising concern with landfill facility is the safe disposal of leachate and high volatile fatty acid (VFA) concentration in leachate provokes the inhibition of biochemical treatment of landfill leachate to the elimination of these serious problems, a microwave-hydrothermal (MH) method has been employed. This new process, named MH method, was developed for the removal of VFA from leachate. The effects of pH, microwave (MW) power, radiation time, and aeration on the removal were investigated. pH and MW radiation time presented significant influence on the removal of VFA. The optimal removal obtained with 625 W power at initial pH 7.2 in 8 min. Aeration presented slight enhancement on the removal. With the optimal operating parameters, the removal of VFA in landfill leachate could reach ≈ 30.7% with aeration. The mechanism of VFA removal was proposed as the evaporation of molecular VFA by MW radiation. Compared with heating with an electric oven, MW radiation obtained higher VFA removal. The results show both thermal and nonthermal effects contributed to the removal of VFA and thermal effects played a more significant role on the removal. It could be proposed that MW radiation could significantly alleviate negative effects of VFA on further treatment of leachate and act as an effective pretreatment method of leachate.

Keywords: Microwave radiation; Volatile fatty acid; Landfill leachate; Thermal effect