Analysis of removing Volatile Organic Compounds in TiO_2 coated photocatalyst / biofilter hybrid system

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Removal performance of the biofilter system for the removal of Toluene was evaluated to optimize operation conditions. TiO_2 catalyst was coated on the optical fiber by a sol-gel method. Light source was used 500W high pressure mercury UV lamp. Biofiltration involves the passage of a polluted air stream through a packed bed containing microorganisms immobilized within a biofilm attached to the bed-packing material. A biofilter system used in this study was packed with glass-type media with 5L of bed volume and inoculated with mixed microorganisms obtained from a sewage treatment plant. The biofilter systems were operated at an EBRT (Empty Bed Retention Time) of 20~30s under nitrogen deficient condition where nutrient solution was supplied only 1L every 2 weeks. Toluene concentration of 10~20 ppmv corresponded to elimination capacity 12 ~ 60 g/m3 h. Air flow rate is 10L/min. GC (Gas Chromatography) and MS (Mass Spectroscopy) were used for analysis of the Toluene removal capacity and detection of Toluene degradation byproduct.