

## Novel pilot plant-scale graywater treatment system using titanium ball, membrane and advanced oxidation process

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Received 1 October 2008; Accepted in revised form 2 September 2009

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### ABSTRACT

In this study, graywater, which is defined as all household wastewater originating from a source other than the toilet, was treated through a process combining titanium ball, microfiltration membrane and advanced oxidation treatment. Removal efficiency of COD, suspended solids, turbidity, color and *E. coli* was studied to determine the possibility of reuse of the graywater as water for fire fighting, irrigation, toilet and car washing. The pH was 7–7.7. The removal efficiency of each factor using titanium ball was as follows: COD 90%, suspended solids 92%, turbidity 98%, color 95%, and *E. coli* 2%. Removal efficiency of each factor using a microfiltration membrane was as follows: COD 98%, suspended solids 96%, turbidity 100%, color 98%, and *E. coli* 30%. As a subsequent process, removal efficiency of each factor by using an advanced oxidation process was as follows: COD 99%, suspended solids 100%, turbidity 100%, color 100%, and *E. coli* 100%. The quality of the treated graywater was sufficient to establish a sustainable water circulation system to reuse apartment wastewater. The TB (titanium ball)–membrane–OP system satisfied the standards for the reuse of water in Korea, which are as follows: COD of less than 20 mg/L, turbidity of less than 2 NTU, color of less than 20 Pt-Co, suspended solids of less than 5 mg/L, no detection of *E. coli*.

*Keywords:* Graywater; Titanium ball; Membrane; Advanced oxidation process

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