Application of airlift ceramic ultrafiltration membrane ozonation reactor in the degradation of humic acids

Haowen Mei\textsuperscript{a}, Hui Xu\textsuperscript{a}, Hongke Zhang\textsuperscript{b}, Wenheng Jing\textsuperscript{a,*}, Weihong Xing\textsuperscript{a}

\textsuperscript{a}State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemistry and Chemical Engineering, Nanjing Tech University, No. 5 Xin Mofan Road, Nanjing 210009, P.R. China, Tel. +86 25 83589136; emails: hwm0217@njtech.edu.cn (H. Mei), xuhui668258@163.com (H. Xu), Fax: +86 25 83172292; email: jingwh@njtech.edu.cn (W. Jing), Tel. +86 25 83172288; email: xingwh@njtech.edu.cn (W. Xing)

\textsuperscript{b}Wanhua Chemical Group Co., Ltd, Yantai, Shandong Province 264006, P.R. China, Tel. +86 535 3388668; email: hkzhang@whchem.com

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\textbf{ABSTRACT}

A novel airlift reactor for the removal and degradation of humic acids (HAs) was presented and employed, combining a ceramic membrane reactor with a pressurized ozonation process. The degradation of organic matter was enhanced since HA could be effectively rejected in the reactor by adopting TiO\textsubscript{2} ultrafiltration membrane with an average pore size of 5.5 nm. Ozone was pressurized into the reactor to improve both the reaction and the separation processes. In addition, the application of compressed gaseous ozone can alleviate membrane fouling by reaction with HAs to reduce the thickness of filter cake. Thanks to the effective retention and catalytic ozonation of the TiO\textsubscript{2} membrane, the removal rate of COD\textsubscript{Cr} and TOC increased to 91.0, 70.0\% from 61.0, 36.5\%, respectively, compared with a conventional airlift reactor. Further, the ratio of BOD\textsubscript{5}/COD increased to 0.52 from 0.01, which means the biodegradability of the feed solution was significantly improved with the reactor, thus it could play an important role in improving the efficiency of water treatment and reducing the cost of downstream biological steps.

\textit{Keywords:} Ceramic membrane; Ozonation; Airlift membrane reactor; Humic acids