Performance determination of a novel dynamic membrane reactor for slightly contaminated surface water treatment

Zhenxun Yu\(^a\), Kan Wang\(^a\),* Huihui Wang\(^b\), Qihong Zheng\(^a\), Junrui Chen\(^a\)

\(^a\)Faculty of Architecture, Civil Engineering and Environment, Ningbo University, Zhejiang 315211, China, Tel. +86 574 87608314; Fax: +86 574 87600337; email: yuzhenxun@nbu.edu.cn (Z. Yu); Tel. +86 574 87609525; Fax: +86 574 87600337; email: wangkan@nbu.edu.cn (K. Wang), Tel. +86 574 87609526; Fax: +86 574 87600337; email: zhengqihong@nbu.edu.cn (Q. Zheng); Tel. +86 574 87608314; Fax: +86 574 87600337; email: chengjunrui@nbu.edu.cn (J. Chen),

\(^b\)College of Civil Engineering and Architecture, Jiaxing University, Zhejiang 314001, China, Tel. +86 573 83643497; email: w-hui-hui@163.com

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ABSTRACT

A novel lab-scale bio-diatomite dynamic membrane reactor (BDDMR) using a module made of stainless steel mesh with an equivalent aperture of 80 \(\mu\)m was proposed to treat the slightly contaminated surface water. This work presents complete information on the impurities removal performance and mechanisms involved in this process. The BDDMR was very effective at reducing particle number and removing turbidity, chemical oxygen demand \((\text{COD}_{\text{Mn}})\), dissolved organic carbon, UV absorbance at 254 nm \((\text{UV}_{254})\), \(\text{NH}_3\)-N and trihalomethane formation potential with a hydraulic retention time of 4 h. The filtration resistance of each of the selected fluxes was investigated, which indicated that the resistance of high flux increased faster than that of lower flux. Three individual effects responsible for removing pollutants, such as microbial biodegradation, bio-diatomite adsorption and bio-diatomite dynamic membrane were determined. Furthermore, dissolved organic matter fractionation and molecular weight distribution were applied to reveal the pollutant removal mechanisms of the BDDMR.

Keywords: Bio-diatomite dynamic membrane reactor; Dissolved organic matters; Drinking water treatment; Membrane fouling; Slightly contaminated surface water

*Corresponding author.

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