



Effects of micro-organism growth phase on the accumulation and characteristics of soluble microbial products in MBR

Chun Xiao, Hongqiang Ren*, Yan Zhang, Ke Xu, Jinju Geng, Lili Ding, Jin Hu, Tingting Zhang

*State Key Laboratory of Pollution Control and Resource Reuse, School of the Environment, Nanjing University, 163 Xianlin Ave. Nanjing, Jiangsu 210023, P.R. China
Tel./Fax: +86 25 89680512; email: hqren@nju.edu.cn*

Received 21 August 2013; Accepted 13 November 2013

ABSTRACT

Soluble microbial products (SMP) have been demonstrated as a primary obstacle for the widespread application of membrane bioreactor (MBR). This study has investigated the effects of micro-organism growth phase (MGPs) on the accumulation and characteristics of SMP in MBR. The results showed that there were three MGPs in the experiment, including exponential growth phase (EGP), deceleration growth phase (DGP), and stationary growth phase (SGP), respectively. Polysaccharides and proteins in SMP were steadily increased in the EGP. While in the DGP, the SMP were increased firstly and then decreased sharply. Finally, the concentrations of SMP maintained at a low steady level in the SGP. Furthermore, the biomass associated products (BAP) batch experiment showed that the production potential of SMP was the largest in the DGP. The percentage of SMP (>30 kDa) was remarkably increased, then dropped due to abruptly decreasing production potential of BAP and degradation by acclimated micro-organisms. The results analyzed by excitation-emission matrix fluorescence spectroscopy indicated that the variation of protein-like substances showed a similar trend with the total SMP, while the humic acid-like substances were related with micro-organism slightly. Our results demonstrated that different MGPs played a significant role in the quantity and quality of SMP in MBR.

Keywords: Soluble microbial products; Membrane bioreactor; Micro-organism growth phase; Excitation-emission matrix fluorescence

*Corresponding author.