



## Effects of temperature on nutrient removal performance of a pilot-scale ABR/MBR combined process for raw wastewater treatment

Peng Wu<sup>a,b,\*</sup>, Qi Peng<sup>c</sup>, Lezhong Xu<sup>a,b</sup>, Jianfang Wang<sup>a,b</sup>, Zhenxing Huang<sup>d</sup>,  
Jiachao Zhang<sup>e</sup>, Yaoliang Shen<sup>a,b</sup>

<sup>a</sup>School of Environmental Science and Engineering, Suzhou University of Science and Technology, Suzhou 215009, China, Tel./Fax: +86 512 68256233; emails: [wupengniu@126.com](mailto:wupengniu@126.com) (P. Wu), [kgre505@163.com](mailto:kgre505@163.com) (L. Xu), [Wjf302@163.com](mailto:Wjf302@163.com) (J. Wang), [ylshen@mail.usts.edu.cn](mailto:ylshen@mail.usts.edu.cn) (Y. Shen)

<sup>b</sup>Jiangsu Collaborative Innovation Center of Technology and Material of Water Treatment, Suzhou 215009, China

<sup>c</sup>School of Life Sciences, Shaoxing University, Shaoxing 312000, China, email: [642230489@qq.com](mailto:642230489@qq.com)

<sup>d</sup>School of Environmental and Civil Engineering, Jiangnan University, Wuxi 214122, China, email: [269580035@qq.com](mailto:269580035@qq.com)

<sup>e</sup>College of Resources and Environment, Hunan Agricultural University, Changsha 410128, China, email: [254651637@qq.com](mailto:254651637@qq.com)

Received 2 November 2014; Accepted 30 April 2015

---

### ABSTRACT

For the purpose of achieving relatively high efficiency, low energy demands, and easy maintenance for nutrient removal, the performance of a pilot-scale biological nutrient removal process consisting of anaerobic baffled reactor and membrane bioreactor has been evaluated for 301 d in treating two kinds of raw wastewaters. The results showed that the process enabled a relatively stable and high performance in both organics and nutrient removals, and high quality effluent was achieved under temperature of  $25 \pm 5^\circ\text{C}$ . When the ambient temperature were  $10 \pm 5$  and  $35 \pm 5^\circ\text{C}$ , average COD,  $\text{NH}_4^+\text{-N}$ , TN, and TP removal efficiencies of both kinds wastewaters were more than 88, 87, 70, and 75%, respectively. Analysis of the results by fluorescence *in situ* hybridization showed that ammonia-oxidizing bacteria, nitrite-oxidizing bacteria, and phosphorus-accumulating organisms were always the enriched micro-organisms in the process during the change of temperature, ensuring the efficient nutrient removal under ambient environment with low energy exhaustion.

*Keywords:* ABR; Community analysis; MBR; Temperature; Domestic sewage; Nutrient removal

---

\*Corresponding author.