Nitrobenzene removal from micro-polluted water resource by a submerged MBR and the importance of activated sludge

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\textbf{ABSTRACT}

A submerged membrane bioreactor (MBR) employed for nitrobenzene-contain water resource treatment was operated for investigation of system effectiveness and for specification of nitrobenzene (NB) removal pathway. Two sludge retention times (2 and 25 d) that regulated biomass content in MBR were adopted to evaluate the importance of activated sludge for NB removal through biodegradation way. From a long-term examination, both of organic biodegradation by activated sludge and rejection by fresh and/or fouled membrane were the major ways to remove organic matters including NB. However, activated sludge played a rather significant role in NB removal. A lengthening solid retention time form 2 to 25 d in MBR resulted in a significantly improvement of removal efficiency in dissolved organic matters, ammonia-N and NB, due mainly to the continuous accumulation of biomass within bulk. Especially, the NB removal efficiency displayed an apparently positive correlation with the biomass content. After sludge acclimation process, the MBR was able to remove NB by a removal rate at 1.266 mg/(gMLSS h), equivalent to the NB removal efficiency up to 80%. In addition, by Fluorescence excitation-emission matrix observation, it was found that biomass growth and accumulation could also impact the effective removal of organic fractions, as that there were obvious selectivity of organic removal by biodegradation of activated sludge. The experimental results obtained herein are very useful to recognize the refractory organics removal pathway in MBR, and to understand the importance of activated sludge.

\textit{Keywords}: Activated sludge; Micro-polluted water resource; Nitrobenzene (NB); Submerged MBR

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