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Degradation of EE2 by Different Consortium of Enriched Nitrifying Activated Sludge

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Abstract : 17α-ethinylestradiol (EE2) is a recalcitrant micropollutant which is found in small amounts in municipal wastewater. But these small amounts still adversely affect for the reproductive function of aquatic organisms. Evidence in the past suggested that full-scale WWTPs equipped with nitrification process enhanced the removal of EE2 in the municipal wastewater. EE2 has been proven to be able to be transformed by ammonia oxidizing bacteria (AOB) via co-metabolism. This research aims to clarify the EE2 degradation pattern by different consortium of ammonia oxidizing microorganism (AOM) including AOA (ammonia oxidizing archaea) and investigate contribution between the existing ammonia monooxygenase (AMO) and new synthesized AOM. The result showed that AOA or AOB of N. oligotropha cluster in enriched nitrifying activated sludge (NAS) from 2mM and 5mM, commonly found in municipal WWTPs, could degrade EE2 in wastewater via co-metabolism. Moreover, the investigation of the contribution between the existing ammonia monooxygenase (AMO) and new synthesized AOM demonstrated that the new synthesized AMO enzyme may perform ammonia oxidation rather than the existing AMO enzyme or the existing AMO enzyme may has a small amount to oxidize ammonia.

Keywords : 17α-ethinylestradiol, nitrification, ammonia oxidizing bacteria, ammonia oxidizing archaea
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