

A Study on Inducing Anammox Reaction by the Addition of Its Intermediates in Nitrogen-Removal Bioreactor

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Abstract

Recently, several new technologies for nitrogen removal have been discovered and applied by the use of new microbial pathways. Among them, the anaerobic ammonium oxidation (ANAMMOX) process is promising novel option for removing nitrogen from wastewater. However, process start-up and development could be hindered by the relative low growth rate of the responsible bacteria. This work aims to evaluate the development of anammox process by the addition of its intermediate products (hydrazine, N_2H_4 hydroxylamine, NH_2OH) in nitrogen-removal bioreactor. The experiment was conducted in three upflow anaerobic sludge blanket (UASB)-like reactors with each having working volume of 1 L. All of them were seeded by repeat incubation of potential anammox bacteria from our previous report. Two reactors was in turn performed under different operating conditions in terms of supplying anammox intermediates concentration and adding mode (pulse injection or continuous), while the last one was used as control reactor (without the addition of anammox intermediates). The results showed that supplementation of the reactors with hydrazine and hydroxylamine can induce the anammox activity. The nitrogen removal rate can be increased up to 15 -30% in comparison to control reactors. However, further results revealed that ammonium oxidation to nitrite/nitrate could simultaneously occur by an addition of NH_2OH only, and continuous adding mode can be preferred for accelerating anammox reaction. It supposed that the

anammox intermediates (particularly, hydrazine) contents in the substrate would be one of the important parameters for speeding up the acclimating period of anammox bacteria. Further studies on characterization of the microbial community structure under different operating conditions should be investigated.

References

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