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Pre-oxidation of ammonium using nanofiltration membranes for partial nitrification preceding Anammox (Article)

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Abstract

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This study examined the pre-oxidation of ammonium using a nanofiltration (NF) hollow fiber membrane module to provide an alternative to conventional partial nitrification preceding Anammox. A permeability study showed that NF membranes were suitable for use in the pre-oxidation of ammonium due to high ammonium fluxes across the membrane (low rejection of ammonium), while most COD (in the form of glucose) was retained inside the bulk phase (high rejection of glucose-COD). In pre-oxidation, ammonium oxidizing bacteria (AOB) grown in the shell-side of the membrane module could oxidize the ammonium diffusing from the tube side mainly to nitrite, which then diffused back into the tube side, resulting in a mixture of ammonium and nitrite in the exit stream in an approximately equimolar ratio. This would meet the requirement for the Anammox process as suggested by previous reports. The application of a membrane process for the pre-oxidation of ammonium was found to be promising at a laboratory-scale, and practically viable at a scale similar to a full-scale reactor (Whitlingham STC, Norwich, UK) based on an estimate of the number of HF modules needed. However, a proper optimization study of the process is strongly recommended so that its feasibility could be further examined at a larger scale linking both nitrification and Anammox together. © 2018

Author keywords

[Anammox](#) [Nanofiltration](#) [Partial nitrification](#) [Pre-oxidation](#)

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