

# **COLD (9-15° C) DEAMMONIFICATION BIOFILM ACHIEVMENT BY GRADUAL TEMPERATURE DECREASE**

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## **Abstract**

For N-rich wastewater treatment the anaerobic ammonium oxidation (anammox) and nitritation-anammox (deammonification) processes are often used. Temperature gradual lowering by 0.5° C per week achieved a similar maximum total nitrogen removal (TNRR) of 1.5 g N m<sup>-2</sup> at 15° C as at 20° C in a deammonification moving bed biofilm reactor (MBBR). Our experiments show that a biofilm of a deammonification reactor adapted to 15° C successfully tolerates short-term cold shocks down to 9° C retaining a high TNRR.

To study the short-term effect of temperature on the TNRR, a series of batch-scale experiments were performed which showed remarkable TNRRs even at 9-15° C (4.3-5.4 mg N L<sup>-1</sup> h<sup>-1</sup>, respectively). Anammox temperature constants (Q<sub>10</sub>) ranged 1.3-1.6. After biomass was adapted to 15° C, the decrease in TNRR in batch tests at 9° C was lower (15-20%) than for biomass adapted to 17-18° C showing efficient biomass adaption to low temperature. qPCR analysis showed an increase in *Candidatus Brocadia* quantities from 5×10<sup>3</sup> to 1×10<sup>7</sup> anammox gene copies g<sup>-1</sup> TSS despite temperature lowered to 15° C.

## **Keywords**

Deammonification; Reject water; Nitrite inhibition