

Partial nitrification in a sequencing moving bed biofilm reactor (Smbbr) with zeolite as biomass carrier: Effect of sulfide pulses and organic matter presence

- Huiliñir C.^a,
- Fuentes V.^a,
- Estuardo C.^b,
- Antileo C.^c,
- Pino-Cortés E.^d

Abstract

This work aimed to achieve partial nitrification (PN) in a Sequencing Moving Bed Biofilm Reactor SMBBR with zeolite as a biomass carrier by using sulfide pulses in the presence of organic matter as an inhibitor. Two conditions were evaluated: sulfide (HS^-) = 5 mg S/L and vvm (air volume per liquid volume per minute, L of air L^{-1} of liquid min^{-1}) = 0.1 (condition 1); and a HS^- = 10 mg S/L and a vvm = 0.5 (condition 2). The simultaneous effect of organic matter and sulfide was evaluated at a Chemical Oxygen Demand (COD) = 350 mg/L and HS^- = 5 mg S/L, with a vvm = 0.5. As a result, using the sulfide pulse improved the nitrite accumulation in both systems. However, Total Ammonia Nitrogen (TAN) oxidation in both processes decreased by up to 60%. The simultaneous presence of COD and sulfide significantly reduced the TAN and nitrite oxidation, with a COD removal yield of 80% and sulfide oxidation close to 20%. Thus, the use of a sulfide pulse enabled PN in a SMBBR with zeolite. Organic matter, together with the sulfide pulse, almost completely inhibited the nitrification process despite using zeolite. © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Author keywords

AOB inhibition; NOB inhibition; Organic matter; Sulfide doses; Zeolite