Inactivation of ANAMMOX communities under concurrent operation of anaerobic ammonium oxidation (ANAMMOX) and denitrification

A concurrent operation of anaerobic ammonium oxidation (ANAMMOX) and denitrification was investigated in a well known UASB reactor seeding with both ANAMMOX and anaerobic granular sludges. ANAMMOX activity was confirmed by hydroxylamine test and the hybridization of biomass using the gene probes of Amx 820 and EUB 338 mixed. Denitrification was observed through the reductions of both COD and nitrate–nitrite concentrations under anaerobic/anoxic conditions. By providing a stoichiometric ratio of nitrite to ammonium nitrogen with addition nitrate nitrogen, a gradual reduction of ANAMMOX activity was found with an increase of COD concentration in a range of 100–400 mg l−1. This is equivalent to the COD to N ratio of 0.9–2.0. The COD concentration was found to be a control variable for process selection between ANAMMOX reaction and denitrification. A reduction of COD and nitrate–nitrite concentrations in all reactors confirmed the undergone concurrent denitrification which thrives when sufficient organic matter is available. COD concentration over 300 mg l−1 was found to inactivate or eradicate ANAMMOX communities.