Desalination and Water Treatment
www.deswater.com

8 (2009) 171–176
August

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doi: 10.5004/dwt.2009.681

Storage phenomena in relation to carbon sources for denitrification

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Received 26 January 2009; Accepted 9 June 2009

ABSTRACT

This study presents the effect of substrate composition on the observed respirometric responses in denitrification process. For this purpose different mixtures of organic substrates have been investigated for both enrichment of different cultures and respirometric batch tests. The results of the study provide examples and data on the experimental assessment of storage yield for different substrates and heterotrophic growth yield based on NUR tests. In the tests conducted with biomass acclimatized to a 4-compound substrate mixture of acetate, propionate, ethanol and glucose, the observed anoxic storage yields were assessed as 0.70 gCOD(gCOD)$^{-1}$ when fed with the same mixture and 0.71 gCOD(gCOD)$^{-1}$ when fed only with acetate and propionate. However, for the culture enriched with a 2-compound mixture of acetate–propionate, the observed storage yields were estimated as 0.61 gCOD(gCOD)$^{-1}$ when fed with the 4-compound mixture and 0.71 gCOD(gCOD)$^{-1}$ when fed with acetate and propionate. This result has been evaluated as a possible consequence of culture adaptation. The anoxic growth yields in the tests were calculated to be equivalent to an average of 0.64 gCOD(gCOD)$^{-1}$. The study could serve as a new perspective for the experimental determination of model parameters for the design of activated sludge systems for different substrate compositions.

Keywords: Activated sludge model No. 3 (ASM3); Readily biodegradable substrate; Respirometry; Storage; Nitrate utilization rate (NUR)

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