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Variation of organics, nitrogen and phosphorus within a cycle of a Bio-Denipho system

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ABSTRACT

Profiles of chemical oxygen demand (COD), dissolved oxygen (DO), ammonia nitrogen (NH_4^+–N), nitrate nitrogen (NO_x–N) and phosphorus (P) were established in a cycle of a four-phased Bio-Denipho process. Based on a unit-flow model and the ASM2d, organics degradation, nitrification and denitrification, and phosphorus removal processes were analysed. A switch function has been introduced to address the difference in DO concentrations between the core of biomass flocs and their outer-layers or the bulk suspensions. The calculations indicate that approximately 68% of the denitrification and nitrogen removal resulted from reactions within the anoxic cores of the biomass flocs, where DO was around 0.1 mg l^{-1} or less. This proved to be important mechanisms to phosphorus removal in the model for the four phased ditches. The analyses provide an insight in the nitrification, denitrification, and phosphorus removal mechanisms in such operation system, which is useful for the system diagnosis and optimisation.

Keywords: Activated sludge; Phased isolation ditch; ASM2d model; Bio-Denipho; Nitrification; Denitrification; Phosphorus removal

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