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Denitrification in an anoxic granular reactor using phenol as sole organic carbon source

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#### Abstract

Heterotrophic denitrification of nitrite (denitrification) with phenol as the only organic carbon source was successfully achieved in an Upflow Sludge Blanket (USB) reactor with granular biomass. High nitrite removal (over 95 %) and complete biodegradation of phenol were obtained at low COD/N ratio ( $2.5 \pm 0.1$ ) and at high nitrogen and organic loading rates ( $0.6 \pm 0.1 \text{ g N L}^{-1} \text{ d}^{-1}$  and  $1.6 \pm 0.3 \text{ g COD L}^{-1} \text{ d}^{-1}$  at  $30 \text{ }^\circ\text{C}$ , respectively). The granulation remained stable throughout the operational period with an average granule size of  $0.9 \pm 0.1 \text{ mm}$  and 95 % of the biomass with a diameter higher than 0.2 mm. The denitrifying granular biomass was also able to use nitrate as electron acceptor after one year consuming exclusively nitrite. However, the granular biomass was not able to use *o*-cresol as electron donor although phenol and nitrite degradations were not affected by the presence of *o*-cresol and the granules remained stable. Most of the genera identified in the granules after one year operation of the anoxic USB reactor

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