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SBR中生物除磷颗粒污泥的反硝化聚磷研究

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中文摘要

反硝化聚磷菌(DNPAOs)可利用厌氧储存的聚-3-羟基丁酸(PHB)以硝酸盐和亚硝酸盐为电子受体进行过量吸磷和反硝化,从而达到在低碳源下脱氮除磷的双重目的.本试验在SBR反应器中,采用厌氧/缺氧/好氧(A/A/O)交替运行的方式,将富集聚磷菌(PAOs)的颗粒污泥成功地诱导为具有反硝化聚磷能力的颗粒污泥.诱导结束后P的去除率在90%以上,NO_x-N的去除率在93%以上,厌氧段释磷量在25~33 mg/L,缺氧段每去除1g NO_x-N吸收P约1.3 g;典型周期运行结果显示,厌氧段最大比释磷速率(SRPR)为18.39 mg/(g·h),缺氧段最大比吸磷速率(SUPR)为23.72 mg/(g·h),最大比反硝化速率(SDNR)为18.19 mg/(g·h),好氧段最大SUPR为17.15 mg/(g·h);颗粒污泥中DNPAOs的数量由诱导前的14.9%增加到80.7%.与除磷颗粒污泥相比,反硝化聚磷颗粒污泥沉速提高0.16~0.7倍,比重提高0.003?1.

英文摘要

The denitrification and excessive P removal can be realized by denitrifying phosphate-accumulating organisms (DNPAOs) under low carbon condition. DNPAOs use poly-3-hydroxy-butyrate (PHB) as electron donor, and use nitrate and nitrite as electron acceptor during the denitrifying phosphate uptake. In this study the biological phosphorus removal granular sludge was induced into the denitrifying and phosphate uptake granular sludge under an anaerobic/anoxic/aerobic alternating operation (referred to as an A/A/O) in a sequencing batch reactor (SBR). When the system is stable, the P and N removal ratio is over 90% and 93% respectively; the release phosphorus is 25-33 mg/L at anaerobic stage; 1g NO_x-N approximately takes up P 1.3 g at anoxic stage. In the typical cycle the anaerobic maximum specific release phosphorus rate (max. SRPR) is 18.39 mg/(g·h); the anoxic max. specific uptake phosphorus rate (SUPR) and the max. specific denitrification rate (SDNR) is 23.72 mg/(g·h) and 18.19 mg/(g·h) respectively; the aerobic max. SUPR is 17.15 mg/(g·h). The fraction of DNPAOs rises from 14.9% to 80.7%. Compared with the physical-chemical property of the biological phosphorus removal granular sludge, the settling velocity and the specific gravity of the denitrifying phosphate uptake granular sludge is elevated 0.16-0.7 times and 0.003?1 respectively.

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