

能源和环境工程

不同碳源类型对生物除磷过程释放磷的影响

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收稿日期 2006-8-9 修回日期 2006-10-19 网络版发布日期 2007-8-3 接受日期

摘要

厌氧释放磷是生物除磷的重要部分, 释放磷不充分是生物除磷不稳定的主要原因。为了研究碳源种类对厌氧生物除磷的影响, 以A2/O氧化沟工艺好氧末端活性污泥为研究对象, 投加乙酸钠、丙酸钠、葡萄糖、甲醇和乙醇等碳源, 在厌氧和缺氧状态下进行释放磷试验研究。结果表明: (1) 在厌氧条件下, 聚磷菌 (PAOs) 以乙酸钠或丙酸钠为碳源释放磷速率很快, 120 min平均比释放磷速率分别为290.5和236.7 mg P · (g VSS) ⁻¹ · d⁻¹; PAOs利用葡萄糖、乙醇和甲醇释放磷速率较低, 比释放磷速率分别为49.4、38.8和8.91 mg P · (g VSS) ⁻¹ · d⁻¹; (2) 在缺氧条件下, PAOs以乙酸钠或丙酸钠为碳源释放磷速率与厌氧状态下释放磷速率相差不大, 而其他3种碳源作用下, PAOs并不释放磷; (3) 初始NO₃⁻过高时, 乙酸钠作为碳源, PAOs在释放磷结束后利用NO₃⁻作为电子受体进行反硝化吸收磷。

关键词

[生物除磷](#) [厌氧释放磷](#) [碳源](#) [PAOs](#) [NO₃⁻](#)

分类号

Effect of different types carbon sources on phosphorus release in enhanced biological phosphorus removal process

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Abstract

Phosphorus release (P-release) is one of the important factors in enhanced biological phosphorus removal (EBPR) process, and insufficient P-release usually is the main reason for the instability of EBPR. In order to study the effect of different types of carbon sources on P-release, the effluent activated sludge of the aerobic zone of the anaerobic-anoxic-aerobic oxidation ditch process was used. Different types of carbon sources, such as acetate, propionate, glucose, ethanol and methanol were used. The main test was made through captive test with a 10 L reactor. The results indicated that: (1) In anaerobic conditions, poly P-accumulating organisms (PAOs) released P rapidly with acetate or propionate acting as carbon sources, and the specific P release rate was 290.5 and 236.7 mg P · (g VSS) ⁻¹ · d⁻¹, respectively. However with glucose, ethanol or methanol acting as carbon source, P released slowly, the specific P release rate was 49.4, 38.8 and 8.91 mg P · (g VSS) ⁻¹ · d⁻¹ respectively. (2) Whereas in anoxic conditions, P release rate was just the same as the anaerobic conditions if acetate or propionate acted as carbon sources. But P was seldom released with glucose, ethanol or methanol acting as carbon source in anoxic conditions. (3) PAOs utilized NO₃⁻ to uptake P after P-release, if original NO₃⁻ was high enough, and acetate acted as carbon source.

Key words

[enhanced biological phosphorus removal \(EBPR\)](#) [anaerobic phosphate release](#) [carbon source](#) [PAOs](#) [nitrate](#)

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