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好氧污泥颗粒化中胞外聚合物（EPS）的动态变化

Dynamic changes of EPS in aerobic sludge granulation

关键词：胞外聚合物（EPS） 活性污泥 颗粒污泥 紧密结合型EPS 松散结合型EPS 溶解性EPS

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摘要：在SBR中分别运行普通活性污泥和好氧颗粒污泥工艺，考察普通絮体污泥颗粒化过程中EPS的组分变化和分布情况.结果表明，通过减少沉淀时间可以获得质量高的颗粒污泥，污泥系统中的EPS可划分为紧密结合型、松散结合型和溶解性3种；普通污泥期、颗粒污泥初期和颗粒污泥稳定期的EPS含量均以紧密结合型EPS为主，颗粒污泥中总EPS和溶解性EPS含量均高于普通污泥，且颗粒形成初期溶解性EPS增长明显；颗粒污泥中紧密结合型EPS含量相对稳定，松散结合型EPS在不同污泥中含量很低，一个典型反应周期中蛋白质和多糖的变化趋势普遍是先降低后上升，普通污泥和颗粒污泥EPS中蛋白质含量均高于多糖，颗粒形成初期EPS中蛋白质含量有明显上升；普通絮体污泥中EPS和细菌分布均匀，颗粒污泥的表层聚集大量的细菌、内部主要成分是EPS.

Abstract：In a sequencing batch reactor (SBR) conventional activated sludge and aerobic granules were cultivated successively. The changes in the components and distribution of extracellular polymeric substances (EPS) on the formation of granules were investigated. Shortened settling time was found to be favorable for successful granulation. EPS that existed outside of cells and in the system of SBR could be subdivided into tightly-bound EPS, loosely-bound EPS and soluble EPS. The tightly-bound EPS dominated the EPS in floc sludge and granules at both the initial and steady states. The content of soluble EPS as well as the total EPS were higher in granules than those in floc sludge. The soluble EPS obviously increased at the initial state of granule formation. In contrast, the content of tightly-bound EPS was relatively stable in granular sludge, and the loosely-bound EPS in different sludges showed low contents. For the composition of the EPS, the variations of protein and polysaccharide contents both showed a typical cycle of initially decreasing and then increasing, and the protein concentration increased sharply at the initial state of granule formation. Also, the protein content was higher than polysaccharide in both floc sludge and granular sludge. It appeared that EPS and bacteria distributed evenly in floc sludge, while bacteria had a large distribution on the surface of granules and the centers of granules were mainly occupied by EPS.

Key words：extracellular polymeric substances activated sludge granular sludge tightly-bound EPS loosely-bound EPS soluble EPS

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