Utilization of micro-electrolysis, up-flow anaerobic sludge bed, anoxic/oxic-activated sludge process, and biological aerated filter in penicillin G wastewater treatment

Yuan-feng Qi, Sheng-bing He, Su-qing Wu, Bi-bo Dai, Chang-hua Hu

School of Environmental Science and Engineering, Shanghai Jiaotong University, Shanghai 200240, China, Tel. +86 21 34203734; email: yuanfengq@qq.com (Y.-f. Qi), Tel. +86 21 34203734; Fax: +86 21 54740825; emails: heshengbing@sjtu.edu.cn, Shengbing_he@163.com (S.-b. He), wusuqing@sjtu.edu.cn (S.-q. Wu)

Shandong ATK Environmental Engineering Company Limited, Jinan 250101, China, Tel. +86 531 82375813; email: divesbob@vip.163.com

Zhejiang Shenghua Biok Biology Co., Ltd., Huzhou 313220, China, Tel. +86 572 8409998; email: hch@shenghuagroup.com

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ABSTRACT

System which included micro-electrolysis (ME), up-flow anaerobic sludge bed (UASB), anoxic/oxic (A/O) activated sludge process and biological aerated filter (BAF) were investigated in penicillin G-processing wastewater treatment. The main quality of the wastewater was shown as follows: chemical oxygen demand (CODcr) of 1,4507–1,5280 mg L⁻¹, ammonium nitrogen (NH₃–N) of 598–826 mg L⁻¹, suspended solid of 1,850–2,190 mg L⁻¹, and pH of 3.5–5.2. Moreover, penicillin G residue in the wastewater was 130–150 mg L⁻¹. ME was utilized as the pretreatment method, UASB and A/O process were designed for the secondary treatment, and BAF was used as the advanced treatment. The results revealed that biodegradability of the wastewater could be effectively improved by ME, and most of CODcr and NH₃–N in the wastewater could be removed by UASB and A/O process, and the residual COD and NH₃–N could be removed by BAF. The average COD and NH₃–N in final effluent was about 275.3 and 19.8 mg L⁻¹, respectively, and the treated wastewater quality reached the requirement of the national discharge standards (wastewater quality standards for discharging into municipal sewer pipelines, China, COD ≤ 300 mg L⁻¹, NH₃–N ≤ 25 mg L⁻¹ in C standard). Especially, about 80% of penicillin G residue in the wastewater could be removed or converted by ME reactor, and the wastewater could be effectively deposed in this system.

Keywords: Penicillin G wastewater; Biodegradability; Micro-electrolysis; UASB; BAF; System methods

*Corresponding author.