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Application for acrylonitrile wastewater treatment by new micro-electrolysis ceramic fillers

Deyi Huang, Qinyan Yue*, Kaifang Fu, Bingjie Zhang, Baoyu Gao, Qian Li, Yan Wang

Shandong Provincial Key Laboratory of Water Pollution Control and Resource Reuse, School of Environmental Science and Engineering, Shandong University, Jinan 250100, China, Tel. +86 531 88365258; email: 820794390@qq.com (D. Huang), Tel. +86 531 88365258; Fax: +86 531 88364513; email: qyyue58@aliyun.com (Q. Yue), Tel. +86 531 88365258; emails: 93670011@qq.com (K. Fu), 942259089@qq.com (B. Zhang), Tel. +86 531 88366771; email: bygao@sdu.edu.cn (B. Gao), Tel. +86 531 88361812; emails: qianli@sdu.edu.cn (Q. Li), wangyan824@sdu.edu.cn (Y. Wang)

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ABSTRACT

A new kind of micro-electrolysis ceramic fillers (MCF) used to deal with acrylonitrile simulation wastewater was investigated. Scrap iron, powdered activated carbon (PAC), and clay were employed as raw materials to produce the raw MCF. The raw MCF was calcined at 500–600°C for 20–30 min in anoxic condition. The raw materials mass ratio of MCF was determined as 60% clay, 32% scrap iron, and 8% PAC. The microstructure and physical properties which include bulk density (997.2 kg/m^3), grain density (1675.0 kg/m^3), water absorption (18.0%), porosity (41.3%), and specific surface area (30.52 m^2/g) were determined. The effects of pH value, hydraulic retention time (HRT), and aeration on COD_{Cr} and acrylonitrile removal efficiency were studied. The results showed that the optimal conditions were influent pH of 3, HRT of 6 h, and aeration–liquid ratio (A/L) of 10. And the removal efficiency of COD_{Cr} and acrylonitrile was 68.8 and 73.9% under the optimal conditions. When micro-electrolysis reactor ran 40 d continuously, the removal efficiency of COD_{Cr} and acrylonitrile was stable and the fillers did not become hardened. The system still had a good capacity for wastewater treatment.

Keywords: Micro-electrolysis; Scrap iron; Ceramic fillers; Acrylonitrile wastewater

*Corresponding author.