Environmental Engineering and Management Journal

February 2023, Vol. 22, No. 2, 267-276
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu
http://doi.org/10.30638/eemj.2023.021

"Gheorghe Asachi" Technical University of Iasi, Romania

RESEARCH ON THE TREATMENT OF PRINTING AND DYEING WASTEWATER BY BIOLOGICAL CONTACT FILTER PROCESS AND ITS BIOCHEMICAL CHARACTERISTICS

Jinwei Zhang[1], Qiang Zhang[1], Dongyu Lu[2], Qian Ma[1], Ping Luo[1], Xiaoxian Ma[1*]

[1]Beijing ENFI Environmental Protection Co., Ltd., Fuxing Road 12#, Haidian District, Beijing, 100038, China
[2]MCC Ecological Environmental Protection Group Co., Ltd., Shuguang Xili, Chaoyang District, Beijing, 100028, China

Abstract

In this study, a biological contact filter system based on biological activated carbon was successfully established by enriching a large number of microorganisms that can degrade refractory organic compounds such as aromatic compounds and nitrogen on the surface of activated carbon,. The system was used for the treatment of comprehensive wastewater in the printing and dyeing industrial park, and the COD removal rate reached 85%. A number of 18 substances were detected in the influent, and 12 substances in the effluent, and most of the refractory organics were effectively removed. The results of liquid chromatography organic carbon detection (LC-OCD) showed that most of the insoluble organic carbon was removed, most of the macromolecular organic substances was removed or transformed into small molecular substances, and 79% of the small molecular substances was removed. After domestication of printing and dyeing wastewater, *Thauera*, *Geobacter* and *Pseudomonas* had the highest abundance, that is, microorganisms with strong ability to degrade organics, aromatic compounds and nitrogen were enriched, which played a positive role in the process of pollutant treatment. Metabolism and Genetic Information Processing genes had the largest number, and their high biological activity and metabolic ability endowed the system with powerful biochemical functions. A large number of glycosyltransferases (GT) and glycoside hydrolases (GH) endowed the system with unique biological activity and strong hydrolysis and acidification ability. Finally, the system showed a strong ability to treat refractory wastewater. This study sheds light on the subsequent targeted development of efficient treatment process.

Keywords: biological contact filter, functional composition analysis, microbial community analysis, printing and dyeing wastewater, refractory organics

Received: May, 2022; Revised final: December, 2022; Accepted: January, 2023; Published in final edited form: February, 2023

* Author to whom all correspondence should be addressed: e-mail: zjwzhang@sina.com; Phone: +86 10 63960788