Refining wastewater treatment using EGSB-BAF system

Yu Wang, Guangxu Yan*, Qinghong Wang, Chunmao Chen, Min Li, Shaohui Guo

State Key Laboratory of Heavy Oil Processing, Beijing Key Laboratory of Oil and Gas Pollution Control, China University of Petroleum, Changping, Beijing 102249, China, Tel. +86 010 89733335; email: wangyu830220@163.com (Y. Wang), Tel. + 86 010 89739001; email: yangx0919@163.com (G. Yan), Tel. +86 010 89733335; emails: wangqhqh@163.com (Q. Wang), chunmaochan@163.com (C. Chen), Tel. + 86 010 89739001; email: sony8071@sina.com (M. Li), Tel. + 86 010 89732278; email: cupgsh@163.com (S. Guo)

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ABSTRACT

The performance of an expanded granular sludge bed (EGSB) in combination with a biological aerated filter (BAF) system for petroleum refining wastewater treatment was investigated. The system was monitored for two months at a hydraulic retention time of 17.5 h and a digestion temperature of 34 ± 1°C. The results showed that the total chemical oxygen demand (CODCr) and oil removal efficiencies were up to 90 and 87%, respectively, with the average CODCr and oil concentrations of 85 and 11 mg/L in the system effluent. Moreover, almost 97% of suspended solids (SS) were removed by the system and the effluent SS concentration was only 15 mg/L. The sludge yield coefficient of 0.0036 mg/mgCODCr showed a low excessive sludge production for the EGSB reactor. The excellent treatment performance indicated that this EGSB-BAF system could be appropriate for refining wastewater treatment. Besides, methane yield was only about 0.21 mLCH4/mgCODCr in the EGSB reactor, lower than the theoretical yields. The poor methane production together with the low oil concentration and increased biodegradability of effluent indicated that the biochemical reaction of refining wastewater mainly remains in hydrolytic acidification phase in the EGSB reactor. For this reason, it was proposed that a highly efficient anaerobic process such as EGSB could be used as a pre-treatment process to improve the biodegradation performance of the following aerobic biochemical treatment.

Keywords: Petroleum refining wastewater; EGSB; BAF; Methane; Pre-treatment process

*Corresponding author.

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