Desalination and Water Treatment
www.deswater.com

34 (2011) 349–353
October

1944-3994/1944-3986 © 2011 Desalination Publications. All rights reserved
doi: 10/5004/dwt.2011.2046

Reclamation of car washing wastewater by a hybrid system combining bio-carriers and non-woven membranes filtration

Shu-Kang Hsu*, Chien-Hung Chen, Wang-Kuan Chang

Industrial Technology Research Institute, Y200, GEL/ITRI 321 Sec. 2, Kuang Fu Road, Hsinchu, Taiwan 300, R.O.C. Tel. +886-3-5732631; Fax: +886-3-5732349; email: SteelHsu@itri.org.tw

Received 3 September 2010; Accepted 3 January 2011

ABSTRACT

Due to the considerable temporal and spatial variations in precipitation in Taiwan, water usage authorities often impose restrictions on car washing, plant watering, and swimming pool refilling in drought season. In response to these water restrictions, the commercial carwash industry has taken measures to install reclamation systems for recycling and reusing carwash wastewater. Dissolved air flotation (DAF), sand filtration (SF), or Multi-media filtration (MMF) units are common reclamation systems for removing suspended solids (SS) in car wash wastewater. However, these technologies are usually ineffective at removing organic contaminants and result in the accumulation of organic contaminants in reclaimed water system. Alternative technologies with higher efficiency to produce high quality reclaimed water must be developed to meet the water demands of car wash industry during drought season. This paper presents a hybrid system that combines bio-carriers and non-woven membranes filtration. When installed in a car washing reclamation facility, this system can remove both SS and organic pollutants. A large amount of microorganisms can grow on the surfaces of porous bio-carriers made of polyurethane resin. Higher organic removal can be achieved using a bio-carrier system for low organic loading wastewater, such as car washing wastewater. A non-woven membrane made of non-woven material serves as microfiltration system to separate suspended solids from wastewater at a lower operating pressure than other types of ultrafiltration membranes. During 6 months of operation in a car wash facility in northern Taiwan, the average influent COD and SS concentrations were 67 mg/l and 230 mg/l, respectively. After treatment with bio-carriers and non-woven membrane filtration, the COD and SS concentrations in reclaimed water were less than 20 mg/l and 10 mg/l, respectively. During this test period, fresh water was only added to make up the water loss from vaporization to atmosphere and sludge disposal. Compared to DAF and SF in typical car washing reclamation systems, the proposed hybrid system achieved better performance in producing high quality reclaimed water and maintaining stable operation.

Keywords: Car washing machine; Car washing wastewater; Wastewater reclamation; Water reuse; Microfiltration; Non-woven membrane; Bio-carrier

*Corresponding author.

Presented at the AMS6/IMSTEC10, The 6th conference of the Aseanian Membrane Society in conjunction with the 7th International Membrane Science and Technology Conference, Sydney Australia, November 22–26, 2010