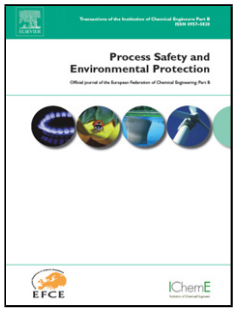

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Authors: Demet Gündogan Kalat, Ahmet Yüceer

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Anaerobic mesophilic and thermophilic treatability of vegetable oil refining wastewater

Demet Gündogan Kalat* and Ahmet Yüceer

Department of Environmental Engineering, Faculty of Engineering and Architecture, Çukurova University, 01330 Balcalı, Adana, Turkey

demetk@cu.edu.tr, ayuceer@cu.edu.tr

*Corresponding author. Tel.:+ 90 322 3386084; fax: +90 322 3386779

E-mail address: demetk@cu.edu.tr (D.G. Kalat).*:

Abstract

Two anaerobic filter reactors, one mesophilic (35°C) and one thermophilic (55°C), were operated with a vegetable oil refining wastewater at varying organic loadings. The organic loading rates (OLR) applied were in between 0.98-9.96 kg COD/m^3/d with a constant hydraulic retention time (HRT) of 24 hours for each filter reactor. The maximum chemical oxygen demand (COD) removal rates were 97% and methane yield 0.39±0.02 L CH_4/g $COD_{removed}$ for each filter reactor. The volatile fatty acids (VFA) concentration in the effluents of mesophilic and thermophilic filter reactors also increased proportionally with the loading rate. The results show that both reactors gave the similar COD removal and methane yield. The data obtained for both mesophilic and thermophilic reactors were then applied to the Stover-Kincannon model and U_{max} and K_B values were determined as 40g/L day, 44.09 g/ L day and 111.11g/L day, 122.78g/L day, respectively.

Keywords: Anaerobic digestion, oil, grease, modeling, half saturation coefficient

1. Introduction

Vegetable oil industry has been developing rapidly in Turkey with increasing cultivation of sunflower, cotton, and maize (Azbar and Yonar, 2004). On average, annually 5,000,000