Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2021.26475

215 (2021) 319–327
March

Potential of auto-thermal mesophilic aerobic stabilization for sludge reduction and organic carbon removal

A.S. Ciggin[a,*], D. Orhon[b]

[a]*Environmental Engineering Department, Akdeniz University, 07058 Antalya, Turkey, email: asliciggin@akdeniz.edu.tr (A.S. Ciggin)*
[b]*Environmental Engineering Department, Faculty of Civil and Environmental Engineering, Near East University, 99138 Nicosia, Mersin10, Turkey, email: orhon@itu.edu.tr (D. Orhon)*

Received 12 April 2020; Accepted 19 August 2010

ABSTRACT

The study involved an experimental study to evaluate and optimize the potential of auto-thermal aerobic stabilization; for this purpose, the impact of major operating conditions was investigated for sustaining a mesophilic environment that would provide the highest possible rate of volatile suspended solids (VSS) reduction. Experiments were conducted in four different sets in order to separately evaluate the effect of significant parameters, such as the aeration rate, the mixing rate, the initial sludge load, and the ratio of primary sludge to biological sludge (PS/BS) on process efficiency. The aeration rate was gradually reduced together with parallel increases in the mixing rate. In the final experimental set conducted with a PS/BS ratio of 50/50, a low aeration rate of 0.2 L/min, and a high mixing rate, reactor temperature was raised to an average level of 36.7°C, with 47.0°C the highest value; the mesophilic conditions sustained by the liberated energy of biochemical reactions induced a VSS reduction rate of 53%, the highest level ever achieved in aerobic stabilization studies reported in the literature. The corresponding chemical oxygen demand (COD) removal was observed as 62%, confirming the observed trend always inducing 10% higher COD removal than the achieved VSS reduction exhibited in all the experiments of the study.

Keywords: Auto-thermal aerobic stabilization; Mesophilic conditions; Sludge reduction; Organic carbon removal

* Corresponding author.

Presented at the 2nd International Conference on the Environment Survival and Sustainability (ESS 2019), 7–11 October 2019, Nicosia, North Cyprus