



A feasible scheme for slaughterhouse wastewater treatment using an anaerobic digestion batch reactor followed by an aerobic treatment stage

Abdelmajid Nassar^a, Husam Al-Najar^b, Reem Abukmeil^{c,*}, Rashed Al-Sa'ed^d

^aDepartment of Environmental Engineering, Islamic University of Gaza, Gaza Strip, Palestinian Authority, Tel. +972 599 403 459; email: anassar@iugaza.edu.ps

^bDepartment of Civil Engineering, Islamic University of Gaza, Gaza Strip, Palestinian Authority, Tel. +972 599 336 745; email: halnajar@iugaza.edu.ps

^cDepartment of Engineering, Faculty of Agriculture, Dalhousie University, Nova Scotia, Canada, Tel. +1 902 324 3958; email: reem.abukmeil@dal.ca

^dInstitute of Environmental and Water Studies, Center of Excellence for Water Studies, Birzeit University, Birzeit, Palestinian Authority, Tel. +972 2-298-2120; email: rsaed@birzeit.edu

Received 4 April 2022; Accepted 3 October 2022

ABSTRACT

The sustainable management of a slaughterhouse wastewater calls for feasible treatment technologies to protect the environment and public wastewater treatment facilities. The technology of up-flow anaerobic sludge blanket provides an adequate procedural condition for the reduction of carbonaceous matter from the high organic wastewater resulted from the slaughterhouses. The scope of this research included a rapid review on current treatment technologies for the slaughterhouse wastewaters and an investigation of the treatment efficiency of an aerobic stage after a pre-anaerobic treatment in a batch system. A batch reactor system of 1 m³ volume with a mixer was developed. The anaerobic stage of the batch reactor was initiated using 400 L of fresh slaughterhouse wastewater mixed with 40 L of primary sludge. Three samples from the anaerobic batch reactor were collected at 10 d interval and then five samples were collected from the reactor after being under aerobic condition at 4 d interval. The removal efficiency of biochemical oxygen demand, chemical oxygen demand, total Kjeldahl nitrogen and PO₄ was 25%, 62%, 42%, and 9% in 30 d, respectively. After the start of aeration system, the removal efficiency was improved up to 94%, 69%, and 93%, respectively, except for PO₄ that showed high variations within the sampling periods.

Keywords: Slaughterhouse wastewater characterization; Anaerobic–aerobic batch treatment; Industrial wastewater treatment

* Corresponding author.

Presented at the 1st Palestinian-Dutch Conference on Water, Sanitation and Hygiene (WASH), and Climate Smart Agriculture (CSA), 5–6 September 2022, Nablus, Palestinian Authority

1944-3994/1944-3986 © 2022 The Author(s). Published by Desalination Publications.

This is an Open Access article. Non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly attributed, cited, and is not altered, transformed, or built upon in any way, is permitted. The moral rights of the named author(s) have been asserted.