

Manuscript ID : 00001-54161

International Journal of Scientific Research In Multidisciplinary Studies

Volume 6, Issue 2, February 2020, Pages 21-28, Page Count - 8



Source ID : 00000513

Experimentation and Design Analysis of Anaerobic Sequencing Batch Reactor for Kano Abattoir

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Abstract

The study determines the treatment of Kano abattoir wastewater to provide a sustainable wastewater treatment mechanism, energy recovery through biogas production and integrating an anaerobic digestion plant for the abattoir. Anaerobic Sequencing Batch Reactor (ASBR) was chosen and explored for the treatment of the abattoir wastewater. The ASBR was subjected to a preliminary phase of 120 days and activated phase for 60 days at a HRT of 16 h. The pilot scale experiment showed that the average biogas production was 0.39L/d while laboratory analysis results for the abattoir wastewater treatment showed that suspended solid (SS) removal efficiency was 10%. Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) and Fats removal efficiencies were 56%, 88% and 65.6% respectively. The proposed ASBR plant for the case study was designed to correspond to three-tank system for domestic wastewater treatment which included primary clarification before ASBR treatment and a sludge digester for primary and excess sludge. Each one of the three anaerobic sequencing batch reactors had the total volume of 150 m³ and has the same treatment capacity. Cycle time of 24 h was considered for each reactor, while reacting time was calculated to be 13.2 h at a flow rate of 5.6 m³/h. Kano abattoir have an average of 250 cattle, 43 camels, 173 sheep and 210 goats being slaughtered per day in the abattoir from 2009 till date, the quantity of influent generated was found to be 416 m³ per day and 151,480 m³ per year. However, ASBR will serves as sustainable wastewater treatment for Kano abattoir.

Author Keywords

Anaerobic Sequencing Batch Reactor (ASBR), Abattoir Wastewater Treatment, Anaerobic Digestion; Biogas Production; Kano Abattoir

Acknowledgement

The authors would like to thank the management and staff of Kano abattoir in Kano State Nigeria, for their support in granting access to the abattoir facilities and providing some required data for the research.

ISSN Print: 2454-6143

Source Type: Journals

Publication Language: English

Abbreviated Journal Title: IJSRMS

Publisher Name: ISROSET

Major Subject: Physical Sciences

Subject area: Mechanical Engineering

ISSN Online: 2454-9312

Document Type: Journal Article

DOI:

Access Type: Open Access

Resource Licence: CC BY-NC

Subject Area classification: Engineering and Technology

Source: SCOPEDATABASE

Reference