

Accepted Manuscript

High rate CNP removal from a milk processing wastewater in a single ultrasound augmented up-flow anaerobic/aerobic/anoxic bioreactor

S. Rezaee, A.A.L. Zinatizadeh, A. Asadi

PII: S1350-4177(14)00324-1

DOI: <http://dx.doi.org/10.1016/j.ultsonch.2014.10.018>

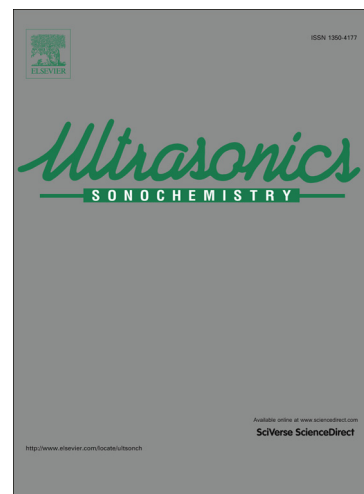
Reference: ULTSON 2723

To appear in: *Ultrasonics Sonochemistry*

Received Date: 2 May 2014

Revised Date: 22 September 2014

Accepted Date: 17 October 2014



Please cite this article as: S. Rezaee, A.A.L. Zinatizadeh, A. Asadi, High rate CNP removal from a milk processing wastewater in a single ultrasound augmented up-flow anaerobic/aerobic/anoxic bioreactor, *Ultrasonics Sonochemistry* (2014), doi: <http://dx.doi.org/10.1016/j.ultsonch.2014.10.018>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

High rate CNP removal from a milk processing wastewater in a single ultrasound augmented up-flow anaerobic/aerobic/anoxic bioreactor

S. Rezaee, A.A.L. Zinatizadeh*, A. Asadi

Water and Wastewater Research Center (WWRC), Department of Applied Chemistry, Faculty of Chemistry, Razi University, Kermanshah, Iran

Email: zinatizadeh@gmail.com, zinatizadeh@razi.ac.ir

Abstract

Simultaneous removal of carbon, nitrogen and phosphorus (CNP) in a single bioreactor is of high significance in terms of reactor volume and energy consumption. Therefore, in this study, an innovative up-flow anaerobic/aerobic/anoxic bioreactor (UAAASB) augmented by ultrasound was developed as a high rate single bioreactor for the simultaneous removal of nutrients from a milk processing wastewater. The ultrasonic irradiation used in this work was in the range of high frequency (1.7 MHz). The central composite design (CCD) and response surface methodology (RSM) were applied to design the experimental conditions, model obtained data, and optimize the process. The effects of three independent variables, i.e. hydraulic retention time (HRT), aeration mode and mixed liquor suspended solid (MLSS) concentration on 10 process responses were investigated. The results prove that the ultrasonic irradiation has a positive effect on the sludge settling velocity and effluent turbidity. The optimum conditions were determined as 12-15 h, 4000-5000 mg/l and 1.5-2 for HRT, MLSS concentration and aeration mode, respectively, based on removal efficiency of $sCOD \geq 90\%$, TN and $TP \geq 50\%$.

Key words: Carbon and nutrients removal, up-flow anaerobic/aerobic/anoxic bioreactor, ultrasound, dairy wastewater.

Download English Version:

<https://daneshyari.com/en/article/7704109>

Download Persian Version:

<https://daneshyari.com/article/7704109>

[Daneshyari.com](https://daneshyari.com)