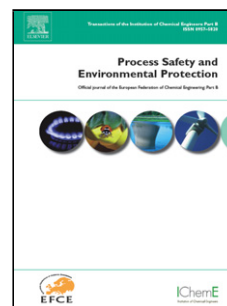


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Comparing two enhancing methods for improving kitchen waste anaerobic digestion: bentonite addition and autoclaved de-oiling pretreatment

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Highlights

- Two enhancing methods for KW mono-digestion were comparative studied
- Enhanced 17.7% methane production with adding bentonite at OLR of 1.39 gVSL⁻¹d⁻¹
- Two methods showed positive effect on CH₄ production and stability at low OLR
- Showed application potential for a KW biogas plant adding bentonite

Abstract

The effects of different enhancement methods, including adding bentonite (1.25%, w/w, wet substrate) and autoclaved de-oiling pretreatment (121°C, 30 minutes), on the anaerobic digestion of kitchen waste (KW) were comparably studied. Mesophilic continuous stirred tank reactors were used under different organic loading rates (OLRs) of 1.11 to 1.84 gVS (volatile solid)L⁻¹d⁻¹ and two different hydraulic retention times (HRTs) (20 d and 25 d). In this study, two enhancement methods and extending HRT could prevent volatile fatty acids (VFA) accumulation and obtain a high methane production at low OLR. Owing to the effect of providing nutrients and buffering capacity, the maximum methane yield was obtained with adding bentonite at OLR of 1.39 gVSL⁻¹d⁻¹. However, for high OLR (1.84 gVSL⁻¹d⁻¹), a decrease of the methane yield and system breakdown occurred due to the accumulation of VFAs. Engineering design and process evaluation of a CSTR biogas plant treating with KW based on the laboratory experiment was stated.

Keywords: Anaerobic digestion; Kitchen waste; Bentonite; Autoclaved de-oiling

1. Introduction

With the increase of urban populations and changes in consumption patterns in China, more than 30 million tons of kitchen wastes (KW) are produced every year (Li et al., 2016). The increasing large amount of KW will become a big threat to environment if there is no reasonable

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