

Assessment of Volatile Fatty Acids production by thermophilic partial anaerobic digestion of blackwater and kitchen waste

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Abstract

In recent years, much attention has been directed towards the biorefinery concept to enhance the resources and energetic recovery from organic wastes. The volatile fatty acids (VFAs) can be biologically produced using organic wastes as substrate through a modified anaerobic digestion process. This process is called acidogenic fermentation and it is an environmentally friendly way to produce VFAs, promoting a sustainable economy. VFAs serve as precursors for the microbial synthesis of a broad spectrum of relevant products for several industries including chemical, pharmaceutical, food and agriculture. This work reports the VFA production by acidogenic fermentation of blackwater (BW) and kitchen waste (KW) and the subsequent valorisation of the VFA through anaerobic digestion (AD) to produce biogas. VFAs production of 5000-7000 mg L⁻¹ were reached when 5 kg of BW and 0.2-0.3 kg of KW were added to the system. The valorisation of this VFA rich stream through AD resulted in a biogas production rate between 4 – 6 L/d with an average composition of 75.6 ± 7.35% methane and 22.81 ± 5.68% of carbon dioxide.

Keywords: Volatile fatty acids, anaerobic digestion, biogas, blackwater, kitchen waste, circular economy.