

ANAEROBIC DIGESTION OF TREATED AND UNTREATED COTTON TEXTILE WASTE

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Abstract

Anaerobic digestion is a potential technology that can produce methane-rich biogas from cotton textile waste. This study assessed the effect of different SIR of 0.5, 1, 1.5, and 2 utilizing treated and untreated cotton substrate under mesophilic, batch digestion process. The treatment process involved digestion of substrate using 0.5 M Na₂CO₃ for three hours at 105°C. The highest methane production was recorded using SIR 0.5 for untreated substrate at 366.8 mL/g VS, or 89.7% of the theoretical methane yield. However, as compared to untreated substrate, treated substrate of SIR 1, 1.5, and 2 exhibited a methane-based degradability by more than 50%. This demonstrates that the treatment process improves the process significantly. The SIR of 1 with larger substrate loading attain a similar production of 306.73 mL CH₄/g VS, which is equal to 75% of the predicted methane yield for treated substrate, whereas SIR 0.5 with untreated substrate generates the best results.

Keywords: Anaerobic digestion, textile waste, cotton waste