

Enhancement of methane production from anaerobic digestion of sewage sludge by low-thermal pre-treatment in semi-technological scale

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Abstract

One of the most challenging issues related with wastewater treatment plants operations is sludge management. Due to a growing population, urbanization and industrialization all over the world production of sewage sludge is still increasing. Thus, there is a strong need to develop more and more economical and environmental friendly technologies for sewage sludge management and converting for bioenergy. Among various technologies used for sewage sludge treatment, anaerobic digestion (AD) is commonly used. However, despite many advantageous, AD cannot allow to highly-effective disrupt and lyse bacterial cells present in sewage sludge. For this reason, many pre-treatment operations are applied before AD.

The aim of this study was estimation of the effect of temperature and duration time of low-thermal pre-treatment (LT-PT) of sewage sludge in semi-technological scale on biogas production during anaerobic digestion process. Pre-treatment of sewage sludge was performed in semi-technological scale at small WWTP in Pomeranian Voivodeship, Poland. Secondary sewage sludge was subjected to LT-PT at: 45°C, 50°C and 55°C with the mixing frequency 30 Hz. The methane production during anaerobic digestion of pre-treated sewage sludge was determined using Automated Methane Potential Test System II (AMPTS II; Bioprocess Control AB, Lund, Sweden). Based on the results obtained in this study, it can be stated that the highest value of methane production was observed after disintegration performed by 24 hours in temperature 55°C.