

CERTIFICATION OF APPROVAL

BIOGAS GENERATION FROM DEGRADATION OF WASTE MUNICIPAL ACTIVATED SLUDGE USING ANAEROBIC DIGESTION AND ULTRASONIC PRETREATMENT

by

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

Biological treatment is used widely in treating the wastewater. However, biological treatment process will produce a large amount of waste sludge which is not favourable to the environment. The waste sludge need to be stabilized before being dispose. Anaerobic digestion process has been proposed as the efficient method in treating sludge, and at the same time producing biogas.

This study focused on the biogas production based on the optimum condition for the anaerobic digestion and the usage of ultrasonic pretreatment. Anaerobic digestion was dependent on some factors for its efficiency. In this research, the factor of temperature was studied in its effect on the anaerobic digestion and biogas production. Two temperature range of anaerobic digestion was studied, which were Thermophilic (49 – 57 °C) and Mesophilic (30 – 38 °C).

Besides that, the usage of ultrasonic pre-treatment was studied in this research, on how it affect the raw sludge in the biodegradability and also, how the sonicated sludge affect the anaerobic digestion. The best condition for the anaerobic digestion was determined by assessing the biogas production and COD removal after the digestion.

Based on the result obtained from this experiment, ultrasonic pre-treatment at amplitude of 40% and frequency of 20 kHz, for 330 minutes has been found to increase the biodegradability of the raw sludge through it sonication process and subsequently increase the biogas production by 137.5% for mesophilic digestion and 46.7% for thermophilic digestion. Besides that, it was found Thermophilic digestion produced more biogas than Mesophilic digestion. For the anaerobic digestion of sonicated sludge, Thermophilic produced 15.7% more biogas than Mesophilic, whereas for anaerobic digestion of non-sonicated sludge, Thermophilic produced 87.5% more biogas than Mesophilic.

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