

**RENEWABLE ENERGY FROM BIOGAS GENERATED BY
SEWAGE SLUDGE: RELATIONSHIP BETWEEN VOLUME OF
SLUDGE AND VOLUME OF BIOGAS**



**INSTITUT PENGURUSAN PENYELIDIKAN
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA**

BY:

**AMINUDDIN MUHAMAD BAKI
ISMAIL ATAN
JURINA JAAFAR
MUHAMMAD AZMI AYUB
RAMLAH MOHD TAJUDDIN
SUHAIMI ABDUL TALIB
SUZANA RAMLI**

DECEMBER 2010

PROJECT TEAM MEMBERS

AMINUDDIN MUHAMAD BAKI
Project Leader



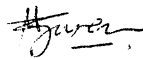
.....
Signature

ISMAIL ATAN
Project Member



.....
Signature

JURINA JAAFAR
Project Member



.....
Signature

ABSTRACT

Biogas composed of methane and carbon dioxide is a by-product of anaerobic bacteria decomposition of organic waste which municipal garbage and sewage are important sources for biogas production. The methane content in the biogas enables it to be used as engine fuel and converted to heat and electricity. An experimental study that examined the relationship between organic content of sludge and methane generation as it progressed through mesophilic anaerobic digestion was completed. This case study is needed to determine organic content represented by BOD and SS in sewage, to quantify the biogas and methane generation from sewage sludge, to determine the relationship between organic content and volume of methane and also to determine the pressure of biogas and the relationship between sludge volume and volume of biogas. It was found that methane generation is potential during anaerobic digestion even with small volume of sludge. The quality of sludge for methane generation is dependent on the characteristics of sludge. Organic content characterized by Biological Oxygen Demand (BOD) and Total Suspended Solid (TSS) were measured in accordance to APHA standard methods (1998). Wastewater from two treatment plants namely, Kolej Mawar, UiTM and IWK WWTP Section 7, Shah Alam were used in this study. This study, found that higher organic content in sewage sludge will result in higher methane being generated.

Keyword: *Methane generation, Sludge Characteristic*

TABLE OF CONTENTS

<i>ABSTRACT</i>	<i>i</i>
<i>ACKNOWLEDGEMENT</i>	<i>ii</i>
<i>TABLE OF CONTENT</i>	<i>iii</i>
<i>LIST OF TABLES</i>	<i>viii</i>
<i>LIST OF FIGURES</i>	<i>x</i>
<i>LIST OF ABBREVIATIONS</i>	<i>xii</i>
1.0 INTRODUCTION	
1.1 BACKGROUND	1
1.2 PROBLEM STATEMENT	4
1.3 OBJECTIVE	5
1.4 SIGNIFICANCE OF STUDY	5
1.5 SCOPE OF STUDY	6
1.6 LIMITATION	8
2.0 LITERATURE REVIEW	
2.1 GENERAL	9
2.2 BIOGAS	10
2.3 ANAEROBIC DIGESTION	12
2.4 DIGESTION PROCESS	15
2.4.1 Stage 1: Hydrolysis	16
2.4.2 Stage 2: Acidification	17

2.4.3	Stage 3: Methanization	17
2.4.3.1	pH value	18
2.4.3.2	Temperature	19
2.4.3.3	Retention Time	19
2.5	ANAEROBIC TREATMENT SYSTEMS FOR MUNICIPAL WASTEWATER	20
2.6	BIOGAS CONVERSION	21
2.7	PRESSURE OF BIOGAS	21
3.0	METHODOLOGY	
3.1	SAMPLING LOCATION	24
3.2	SAMPLING AND SAMPLE PREPARATION	25
3.3	PREPARATION OF DILUTION WATER AND DILUTION METHOD	26
3.4	CHARACTERIZATION OF SLUDGE	26
3.5	EXPERIMENTAL SETUP FOR METHANE PRODUCTION	26
3.6	EXPERIMENTAL SETUP FOR MEASURING PRESSURE OF BIOGAS	28
3.7	RESEARCH PROCEDURES	29
4.0	RESULTS & DISCUSSION	
4.1	CHARACTERIZATION OF SLUDGE	30
4.1.1	Organic Content of Sludge Samples	30
4.1.2	Organic Content	32
4.1.2.1	Biochemical Oxygen Demand (BOD)	32
4.1.2.2	Suspended Solid (SS)	34