CHAPTER I

INTRODUCTION

Introduction

Due to upward trend in energy costs and problems associated with incineration of Municipal Solid Wastes (MSW), there have been developed many technologies that can partially dissolve the problems. Biological conversion of biomass to methane has received increasing attention in recent years. There are many renewable technologies for producing the energy from the solid wastes. Anaerobic Digestion (AD) has become an interesting technology and many research works are going on for the stability of this system. The anaerobic digestion of MSW is a process that has become a major focus of interest in waste management throughout the world.

Quick economic growth by industrialization of the developing countries in Asia. Uncontrolled urbanization has created serious problems of solid waste disposal. Many cities of the Developing Countries are facing problems with municipal solid wastes causes the serious environmental and health risks. Currently, biological treatment methods such as composting and AD offer the only route for recycling organic matter and nutrients from organic fraction of MSW.

One attractive application of anaerobic digestion is for treating municipal solid wastes in order to reduce the wastes to be disposed and to produce renewable energy. Solid wastes in Developing Countries have become great problem because the amounts of the solid wastes are increasing day by day due to rapid population growth and urbanization. The availability of landfill location are declining due to conventional disposal methods and the opening of new landfill location are limited due to legal and financial problems.

Since the municipal solid wastes consist of high proportion of organic fraction and it is understood as organic-biodegradable waste with moisture content around 85-90 %. These wet streams of wastes are not so viable for incineration to produce energy. The incineration generates the air pollutants such as nitrogen dioxide, sulfur dioxide and greenhouse gases. Around the world particularly in urban areas,

pollution of air and water from municipal solid wastes continues to grow. It has become great threat to environmental and public health. Anaerobic digestion not only provides pollution prevention, but also allows for energy, compost and nutrient recovery. In life cycle assessment using eco-indicator method, AD also showed an excellent LCA performance compared to other treatment technology such as composting, incineration.

Anaerobic digestion is an engineered methanogenic decomposition of organic matter in the absence of free oxygen and involves a consortium of different anaerobic microorganism which transforms organic matter into useful energy. Application of anaerobic digestion for waste treatment produces significant benefits that include both energy production and energy conservation. The production of biogas from solid waste materials for using as a fuel source succeeds anaerobic digestion as a sustainable technology for renewable energy source. The anaerobic digestion of the Organic Fraction of Municipal Solid Wastes (OFMSW) yields much better results in thermophilic temperature conditions than in mesophilic temperature conditions.

A given amount of volatile solids of a particular waste can be converted to a maximum amount of biogas at a given temperature provided optimum conditions are prevalent. This conversion can be accounted by two factors i.e. biodegradability at a specified temperature and operating conditions, reactor configuration, the flow pattern within the digester and digestion stage.

It is difficult to summarize on anaerobic digestion of solid waste with similar experimental set up. This difficulty is due to the great diversity of reactor designs which is suited by a large variation of waste composition and choice of operational parameters. The evaluation of the reactor designs can be made in terms of the rate, stability and total of biochemical reactions. The methane of organic wastes is attained by a sequence of biochemical transformations, which can be mainly separated into two steps. The first step consists of hydrolysis, liquefaction and acidification whereas the second step involves the transformation of acetate, hydrogen and carbon dioxide into methane.

Depending upon the number of stages and concentration of total solids, the design of reactor is classified as single system and multi stage system. Similarly the anaerobic rectors can be operated into different.

According to previous studies, there was a problem of low biogas yield, low methane composition and lower removal of volatile solids in the continuous anaerobic digestion system. The problem was due to the design configuration of the reactor. In this study the problems as said above has solved by modifying the design of reactor and the optimization of operational parameters such as organic loading rates, retention time for maximum volatile solids reduction has conducted.

Propose of the study

The main propose of this research is to development temperature control system for biogas production by hybrid solar and biogas energy. The specific objectives of this study are as follow:

1. To determine the biogas tank temperature that suitable for biogas production.
2. To develop the temperature control system for biogas production.
3. To analyze the economic parameter of biogas temperature control system.

Scope of the study

In this research will use the organic solid wastes from restaurant in Nuresuan University. The digester laboratory scale uses two-stage-anaerobic digestion system. And the organic waste is filtered by sieve tray.

Keywords

Biogas / Temperature Control / Hybrid solar and biogas energy

Benefit of the study

1. To use temperature control to various biogas plant for increasing the volume of gas.
2. Knowing the performance of biogas system by temperature control with solar collector and biogas burning.
3. Using the model of temperature control biogas production for application with solar and biogas.