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Feasibility Study and Acceleration of Biogas from Kitchen Waste

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ABSTRACT: Biogas is distinct from other renewable energies because of its characteristics of using, controlling and collecting organic wastes and at the same time producing fertilizer and water for use in agricultural irrigation. Biogas does not have any geographical limitations nor does it require advanced technology for producing energy, also it is very simple to use and apply. Food waste comprises 12.4% of the total municipal solid waste (MSW), according to U.S. EPA estimates. This corresponds to over 40 million tons, according to the 2006 State of Garbage Survey of BioCycle and Columbia University (Arsova et al. 2008). Also, EPA has estimated that less than a million tons are co-composted aerobically with yard wastes (EPA 2007). Kitchen waste is organic material having the high calorific value and nutritive value to microbes, that's why efficiency of methane production can be increased by several orders of magnitude as said earlier. It means higher efficiency and size of reactor and cost of biogas production is reduced. Also in most of cities and places, kitchen waste is disposed in landfill or discarded which causes the public health hazards and diseases like malaria, cholera, typhoid. Inadequate management of wastes like uncontrolled dumping bears several adverse consequences: It not only leads to polluting surface and groundwater through leachate and further promotes the breeding of flies, mosquitoes, rats and other disease bearing vectors. Also, it emits unpleasant odour & methane which is a major greenhouse gas contributing to global warming.

KEYWORDS: greenhouse gas, landfill, digester design, 3port digester.

I. INTRODUCTION

Due to scarcity of petroleum and coal it threatens supply of fuel throughout the world also problem of their combustion leads to research in different corners to get access the new sources of energy, like renewable energy resources. Solar energy, wind energy, different thermal and hydro sources of energy, biogas are all renewable energy resources. Rapid biodegradation of the organic fraction of the MSW is of key importance to identify environmental more responsible way to process it rather than landfilling or composting it. Anaerobic digestion has the advantage of biogas production and can lead to efficient resource recovery and contribution to the conservation of non-renewable energy sources. Furthermore, anaerobic digestion is closed and controlled process and based on fugitive emissions is more preferable than landfilling and aerobic composting (Levis et al. 2010). In this study we have reviewed the anaerobic digestion reactions and examined the AD technologies that are available on the market, in order to identify the most efficient one. Having in mind the difficulties AD plants are facing in practice and the increased interest in finding a sustainable supplemental carbon source for denitrification in the wastewater treatment plants (WWTP), we have also tested the possibility to link these two processes by means of laboratory. This experimental study investigated the possibility to use the volatile fatty acids (VFA), naturally produced in the process of anaerobic acidogenesis from the food waste, as supplemental carbon source for denitrification in the wastewater treatment plants (WWTP).

II. DETECTION OF FEED

At the start of the project the EU Animal by Products Regulation was still in draft form. The Draft Regulation stated that materials that are considered low risk (e.g. food wastes containing meat or those that have been in contact with

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meat) could be treated by composting or anaerobic digestion so long as processing included an “in vessel” stage, the particle size of the material was reduced to less than 12mm, the material was heated to 70°C for one hour, and pathogen limits for Salmonella and Enterobacteriaceae were met. Application to arable land of products from composting and anaerobic digestion would then be permitted. The Regulation would also permit Member States to adopt different approaches to treatment, so long as these were shown to achieve the pathogen limits. The EU draft recommendations were adopted in May 2003, (EU Regulation Laying Down Health Rules Concerning Animal By Products Not Intended for Human Consumption (EC 1774/2002)) and are implemented in the UK by the Animal By-products Regulations (England)2003. The UK Regulations includes alternative treatment standards, in which minimum time/temperature and particle size reduction specifications must be met.

III.DESIGN OF DIGESTER AND GAS HOLDER

In order to make slurry in liquified form, water should be added to food waste in ratio of 1:5 and also for digestion.

Total mass of slurry
= food waste + water
= 0.8 + 4
= 4.8kg

Volume of slurry per day (specific gravity of slurry is about 1090 kg/m³)
= total mass of slurry / specific gravity
= 4.8/1090
= 0.0044 m³

Retention period of slurry
= 40 days

Total volume of digester
= per day volume of slurry × retention period
= 0.0044 × 40
= 0.176m³

DENSITY

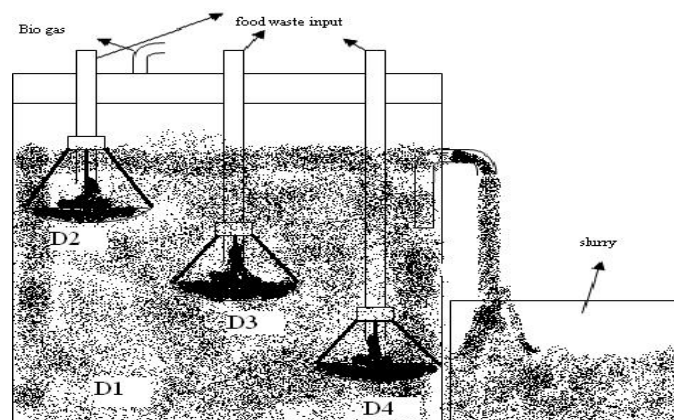
Density of existing bio gas digester inlet= 1.069kg/litre

Outlet= 1.053kg/litre

Density of new bio gas digester inlet = 1.078kg/litre

Outlet= 1.065kg/litre

IV. NEW BIOGAS DIGESTER



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V. CONCLUSION



Fig1.Pre Digester View

From the literature survey, we are very well knows about the usage of bio gas power plant. It has vast usage in different field. It leads to reduce the demand of the LPG gas. So our project will create the awareness about bio gas power plant. More over the slurry out of it will be more useful for irrigation purpose also, and it's a concept of zero% wastage. Our project is to create an Organic Processing Facility to create biogas which will be more cost effective, eco friendly, cut down on landfill waste, generate a high quality renewable fuel, and reduce carbon dioxide & methane emissions. In future it may lead our way in to the field of automotive and also in electricity generation. Its surly adds good fragrance to our growing economy.

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