A REVIEW OF BIOMETHANATION AS A TECHNIQUE FOR EFFICIENT AND EFFECTIVE ENERGY CONVERSION

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ABSTRACT

The rising quantity of municipal waste with insufficient land for dumping as a method of waste disposal has given rise to other options such as converting the waste energy of which biomethanation is one of the methods. Existing number of biomethanation plants are not enough and also the efficiency of the existing plants has been variable. Plants working at their full potential will be helpful in generating more methane gas for a fixedquantity of waste. Methane thus generated can be used for purposes such as fuel for cooking, for vehicles, and also act as a substitute to electricity. This paper reviews characteristics of the plant for its better working efficiency, troubleshooting of existing plants if required and also cost benefit analysis to promote its use instead of conventional LPG.

Keywords: Anaerobic Decomposition, Biomethanation, Energy Conversion

I. INTRODUCTION

The issue of constantly increasing waste (MSW, sewage and industrial) is the rising concern of the governing bodies and also of the people. Serious efforts are necessary to dispose of the waste and the best way is to convert it to energy and put it to our use against the conventional resources. The Municipal Solid Waste contains vegetables which are full of minerals, vitamins, proteins, antioxidants, and dietary fibres. These compounds help in anaerobic digestion and act as a rich source of methane.Energy problems in India have made the need to turn towards waste-to-energy technologies extremely important, as landfills will not serve us till the end.

The work in the field of biomethantion is considerable with new techniques covered and also big capacity plants of 5-10 ton being run successfully. The purpose of biomethanation is to make use of the things that are discarded from households and eateries and convert it to methane gas which can be put to variety of uses viz. for cooking, electricity and also as a replacement for petrol and diesel.

The purpose of this paper is to troubleshoot the existing plants and try to increase their efficiency with elimination of the errors. Even a small error like not removing plastic materials completely from the waste can

affect the output of the plant in a good way. Another example of error is the quantity of feed as a input provided to the plant. Proper feed of waste can help the plant achieve maximum efficiency compared to improper feeding. Biomethanation as a process is a three stage anaerobic process which starts with hydrolysis, acidification followed by methanogenisis. The process involves breaking down of complex compoundsand converting them to monomers which are again broke down to methane and carbon dioxide.

II. METHODOLOGY

- Selection of site.
  The site for the biogas plant must be selected based upon working condition of the plant followed by accessibility.
- Observing the process.
  The process needs to be studied for basic working of the biogas plant.
- Data Collection.
  - Having discussion with the concerned authority of the plant. Gathering information about the daily working of the plant and the current outputs of the plant from the authority and clearing doubts if any.
  - Collecting the required data related to the process. Accumulate more data about the types of works from the internet and other published papers.
- Studying biomethanation process as energy conversion technique. As a technique for energy conversion, analysis of the biogas plant and hence analysis of biomethanation process.
- Selection of bioculture and/or its combination. Bioculture such as catalyst to enhance the processing of biomethanation.
- Testing the output of the plant for the bioculture added.
- Troubleshooting the plant for errors. Checking the plant for errors in manufacturing or human error while assembling and also for other unexplored errors.
- Costs benefit analysis by considering sustainability of process. The cost of assembling a biogas and cost recovery via the output through its efficient conversion in energy.

III. LITERATURE REVIEW

A. Apte, V. Cheernam, M. Kamat, S. Kamat, P. Kashikar, and H. Jeswani : The samples that they tested contained volatile matter upto 85% which strengthened their case of using anaerobic digestion of the solid waste.

A. Hilkiah Igoni1, M. F. N. Abowei, M. J. Ayotamuno and C. L. Eze: They concluded that the percentage of total solids increases the production of biogas in anaerobic digestion process. They established a relationship between volume of biogas produced and percentage of total solid concentration which indicated at some point increase of total solids resulted in no further increase in the biogas quantity.

Mondal C and Biswas G K: They suggested that methane yield per day per kilogram of solid was higher for the dry grinded vegetable as compared to raw vegetable wastes. Thus this study will help the production of biogas within a short period.

A. Hilkiah Igoni a, M.J. Ayotamuno a, C.L. Eze b, S.O.T. Ogaji c, S.D. Probert: They concluded that proper size reduction of MSW, along with other aspects as temperature, loading rate, moisture content, digestion process influence the design of anaerobic digestor. And recommended use of anaerobic digestion systems to make use of the energy from waste and hence contributing to environment protection.

Riek, Isabell; Rücker, Angelika; Schall, Theresa; Uhlig, Manuela: Their research concluded that plant is profitable over its entire life if subsidies are provided. And also it derives non-financial benefits in form of health, local environment benefits and social benefits.

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