

USE OF BIOGAS FOR GENERATION OF WATER AND ENERGY

Prof. Jacinto de Lima Farias Email: jacintofarias1@gmail.com
Escola: EEEP Lysia Pimentel Gomes Sampaio Sales

Participantes: João Vitor Feijão da Silva; Yago Vasconcelos de Araújo; Francisco Davi da Silva Sales

ABSTRACT

Currently the most efficient way to control organic waste is through the use of biodigesters, in addition to acquiring organic fertilizer it is also possible to extract the biogas produced in the process. With this purpose the present work sought to improve this process, using the methane gas burning for the treatment of the slurry itself. It is intended, therefore, to offer an efficient and sustainable form of waste control in landfills, generating water and energy in the process.

Keywords: Organic waste; biogas; sustainability

UTILIZAÇÃO DO BIOGÁS PARA GERAÇÃO DE ÁGUA E ENERGIA

RESUMO

Atualmente a forma mais eficiente de se controlar o lixo orgânico é por meio da utilização de biodigestores, além de adquirir adubo orgânico também é possível extrair o biogás produzido no processo. Com esse intuito o presente trabalho buscou aprimorar este processo, utilizando a queima do gás metano para o tratamento do próprio chorume. Pretende-se, portanto oferecer uma forma eficiente e sustentável de controle do lixo nos aterros sanitários, gerando água e energia no processo.

Palavras-chave: Lixo orgânico; biogás; sustentabilidade

INTRODUCTION

Garbage must be properly disposed of in order to avoid environmental problems, but what can be observed is that a large part of this waste is destined for open-air dumps, resulting in soil contamination, water tables and the proliferation of diseases, in addition to contributing to the emission of greenhouse gases, mainly methane gas (CH₄). From the identification of this problem, the project aims to promote the possibility of treating organic waste through the process of biodigestion. With this it is possible to obtain fertilizer, biofertilizer and biogas, which can be used as biofuel. The project also proposes the use of biogas for the generation of water and energy through the treatment of leachate.

MAIN GOAL

Use biogas from the anaerobic fermentation of organic waste to generate biomass and biofertilizer, as well as develop a leachate treatment system that enables the generation

of water and energy with the inclusion of a monitoring and safety system to monitor production and prevention of gas leaks.

SPECIFIC OBJECTIVES

Develop an alternative way of controlling organic waste.

Reduce the amount of methane gas in the atmosphere. And stimulate the recycling of organic waste producing compost and fertilizer.

Contribute to the development of an energy production and water generation system in sanitary landfills.

METHODOLOGY:

Initially, for the construction of the biodigester, a plastic container with a capacity of 80 liters was used. Then, a system was designed to capture and filter the gases and separate the waste. Three filters were applied to the digester, the first with the objective of promoting the separation of solid waste and slurry, the second to prevent the passage of hydrogen sulphide and the third filter to separate carbon dioxide from methane.

As organic waste to feed the biodigester, it was decided to use the remains of organic matter from school meals, such as fruits, among other foods. For the capture and filtration of biogas, filters, hoses, a refrigerator motor to facilitate the removal of the gas and an air conditioning cylinder for its storage were used.

To ensure the safety of the system, anti-reverse safety valves, pressure gauges, gas sensors and a monitoring system via Arduino board were applied for safety and monitoring of the project.

For the treatment of leachate, the method of evaporation and condensation was chosen to obtain distilled water at the end of the process and remove impurities from the mixture. For this, laboratory glassware was used, as a condenser, and a Bunsen burner. To take advantage of the value generated in this process, a cooler was used to convert the movement energy of the steam into electrical energy.

SOCIAL RELEVANCE OF THE PROPOSAL

In view of the results, the results are evaluated as positive, as this new form of waste treatment can be efficient in reducing environmental impacts for the entire community. In addition, by expanding and improving the use of steam in large landfills, it is possible to generate, in addition to water, energy for cities.

RESULTS

After 30 days, the digester produced a large amount of organic matter, which was used in the school garden. Regarding the leachate, a good part was diluted in water and also used with fertilizer. Part of the leachate was collected and taken to the chemistry laboratory to assess the feasibility of producing water. 30 ml of slurry was used, which was exposed to a heating process to provide evaporation, and the produced water was captured using a condenser. It was observed that at the end of the process, 32 ml of distilled water were produced, and 3.6 ml of slurry remained. This entire stage lasted 11 minutes, and the maximum temperature recorded was 77°C.

IMPACT ON THE DISSEMINATION OF KNOWLEDGE AT SCHOOL

As a development of the project, it was possible to understand the importance of seeking sustainable alternatives for the environment. From there, the project was expanded and involved the engagement of several school students in the development of activities such as recycling organic waste through composting. In addition to raising awareness of the importance of avoiding food waste.

FINAL CONSIDERATIONS

It can be concluded the feasibility of separating the water from the slurry through the producing system, using evaporation and condensation. For this, a source of thermal energy is necessary to provide the heating of the slurry, and the biogás itself can be used, producing during biodigestion. Given the need for more efficient control of solid waste, the possibility of using this technology in landfills is considered. Organic waste constitutes a large part of the garbage in cities, so the high amount of leachate and biogás could be used to produce a large amount of water and energy.

REFERENCES

SANTOS, Elaine Neves. **Educação ambiental por meio da compostagem de resíduos sólidos orgânicos em escolas públicas de Araguari – MG.** Uberlândia, 2007.

OLIVEIRA, Rafael Doléo. **Geração de energia elétrica produzida a partir da fermentação anaeróbica de dejetos em abatedouros e as possibilidades no mercado de crédito de carbono.** São Carlos, 2009.

FAUSTINO, L. S. M.; TRAJANO, M. F.; JUNIOR, I. B. M.; MELLO, V. S. & TORRES, T. F. O. T., 2009. **Tratamento de resíduo orgânico e produção de biogás.** Trabalho apresentado no 2º Simpósio Nacional de Biocombustíveis, Recife, 2009