

# Analysis of Volume and Fraction of BioMethane in Bench-Scale Biodigesters Linked to Dairy Wastewater Treatment

Marcos Gomes Machado <sup>1\*</sup>, Robson Júnior Nunes Abreu <sup>2</sup>, Kaiquy Duarte de Oliveira <sup>2</sup>, Jaqueline de Castro Silveira <sup>2</sup>, Luis Gustavo Alves de Oliveira <sup>2</sup>, Ênio Nazaré de Oliveira Junior <sup>3</sup>

<sup>1</sup> Bachelor's Degree in Bioprocess Engineering, Universidade Federal de São João del-Rei, Ouro Branco, Minas Gerais, Brazil.

<sup>2</sup> Bachelor's Degree in Chemical Engineering, Universidade Federal de São João del-Rei, Ouro Branco, Minas Gerais, Brazil.

<sup>3</sup> Department of Chemical, Biotechnology and Bioprocess Engineering, Universidade Federal de São João del-Rei, Ouro Branco, Minas Gerais, Brazil.

\* E-mail: marcosmachado0808@gmail.com

Whey is an effluent from the dairy industry that has a high organic load, mainly due to the high lactose content in its composition, which can cause serious environmental damage, thus highlighting the need for correct treatment before disposal. The anaerobic biodigestion method is widely used to treat whey, as it is capable of converting organic compounds into biogas, which can be used to generate electricity. In addition, the biodigestate formed at the end of biodigestion can be used as a biofertilizer. Therefore, anaerobic biodigestion has emerged as a way of treating industrial effluents while generating renewable energy and biofertilizer. The objectives of this work were to analyze the volume and concentration of biomethane in bench biodigesters linked to the treatment of dairy effluents. The volume of biogas produced was analyzed in triplicate in biodigesters with a useful volume of 400 mL and whey and inoculum concentrations of 10% (v/v) and 15% (m/v), respectively. The temperature was kept constant at 38±2°C for 08 consecutive days. The efficiency of the effluent treatment was also assessed by the difference in lactose concentration at the start and end of biodigestion using the spectrophotometric method for reducing sugars. The volume of methane was verified indirectly by the volume occupied by it in the container with the gas cleaning solution (SLG). The biomethane content was measured indirectly by titrating the SLG produced in each biodigester. The average result of the triplicate was the production of 219.40±48.89 mL of biogas, with an average theoretical methane percentage of 88.32±1.51% (v/v), inferring a high purity of methane in the biogas. The average lactose removal result of the triplicate samples at the end of the biodigestion treatment was 89.90±0.75%. It can be concluded that the anaerobic biodigestion process proved to be efficient in generating biogas with a high methane fraction. In addition, the lactose content removal results showed that the treatment of the organic load was efficient. Future studies will assess the methane fraction in the biogas produced directly using gas chromatography, evaluate methods for converting the biogas produced into electricity, and assess the effects of using the biodigestate as a biofertilizer.

**Key words:** Biogas; Biomethane; Biodigestion; Wastewater Treatment.

## Análise do Volume e Percentual de BioMetano em Biodigestores de Bancada atrelado ao tratamento de efluentes de laticínios

O soro de leite, possui alta carga orgânica devido principalmente à lactose, o que pode prejudicar o ambiente se descartado sem tratamento adequado. A biodigestão anaeróbia é um método eficaz para converter esse soro em biogás, uma fonte de energia renovável, e biodigestato, usado como biofertilizante. Este estudo analisou a produção de biometano em biodigestores de bancada, observando alta pureza de metano e eficiente remoção de lactose. Futuras pesquisas incluirão a avaliação direta da fração de metano no biogás, métodos de conversão em eletricidade e os efeitos do uso do biodigestato como biofertilizante.

**Palavras-chave:** Biogás; Biometano; Biodigestão; Tratamento de Efluente.

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