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BIOCHEMICAL METHANE POTENTIAL (BMP) ASSAY TO EVALUATE METHANE PRODUCTION IN THE SLUDGE FROM A SEWAGE TREATMENT PLANT IN RIO DE JANEIRO, BRAZIL

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Abstract
Biochemical methane potential (BMP) is defined as a measure of substrate biodegradability determined through the cumulative CH_4 production from a sample anaerobically incubated and monitored over the time. The BMP assay is widely used to test the anaerobic degradability of different organic waste. However, due to the lack of a standardized protocol, the BMP assay presents serious limitations that limit its application by the industry. The reliability of the information generated by these assays can be questioned due to the influence of specific experimental and operational conditions and the way data is presented. The objective of this study was to implement and describe a replicable and low cost methodology for BMP evaluation using anaerobic sludge (AS) from a wastewater treatment plant (WWTP). Anaerobic sludge (AS) from the WWTP operated by the State Company of Water and Wastewater (CEDAE), located in the city of Rio de Janeiro, Brazil, was collected to assess the potential for methane production from sludge in BMP bioreactors developed on a laboratory scale. The experiments were carried out in six replicates at 37±1°C and manually stirred. The sealing system developed was suitable for the experiment proposal. The sludge feeding the bioreactors presented the following physical-chemical characteristics: pH (7.4-7.6), alkalinity (2.382 g $CaCO_3$ L^{-1}), CODi (21.903 mg L^{-1}), TS, TVS and VSS (4.8%, 2.5% and 1.5% respectively). The bioreactors showed cumulative methane production ranging from 124 to 143 mL after 11 days, indicating the reproducibility of the system. The discrete changes in pH and alkalinity during the experiments could be indicative of the microbial community stability during the process. The results showed that the methodology for the construction, calibration and operation of the bench reactors were replicable.

Keywords: Anaerobic digestion, sewage sludge, biochemical methane potential, bioenergy.

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