ANAEROBIC DIGESTION OF BROWN WATER IN BATCH REACTOR

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Introduction. Separation of domestic effluents is a viable alternative for improving wastewater treatment systems. Main benefits are reduction of operating costs and water consumption. In order to reduce the water consumption per flush, vacuum toilets are recommended that spend 1 to 1.5 L/flush and waterless urinals. As a result, water volume per flush sewage is obtained with an organic matter concentration of 9.8 g/L of COD (2). Therefore, the reduction of water volume improves the anaerobic treatments and is an option for on-site treatment. Also, energy and nutrients can be recovered and little space is required (3). The aim of this work is characterize and determinate methane production obtained from anaerobic digestion of BW.

Methods. Samples of feces without urine were diluted in 1.5 L of distilled water, for simulating the vacuum toilet flush. The TS, VS, COD_t, COD_s were determined for characterizing the BW (1). Granular sludge (45 g/L of VS) from a water treatment plant of food industry was used for determining the Biochemical methane potential (BMP). Assays were conducted at 35 °C, pH 6.89 and conductivity of 365.7 µs/cm. Also, a ratio of 4 g COD/L of BW by 4 g/L of VS of granular sludge was used. Biogas composition was determined using a gas chromatograph (Gow-Mac Serie 580). Methane production was monitored in ANKOM^{RF} bottles with an operation volume of 150 mL.

Results. Two samples of feces were characterized with 27.84 ± 5.16 g COD_t/L and a relation of VS/TS of 85 % (Table 1). Also, the samples contained 9.13 ± 2.64 g COD/L of soluble material. Methane production was observed when the granular sludge was used as inoculum, both in the BW1 and BW2 samples, as compared to the control without inoculum (Fig. 1). As a result, a maximum value of 0.1 L of CH_4/gVS_{feed} was attained. Our results were lower than that reported in the literature (4). At 12 culture days, a conductivity of 1302 µS/cm and pH of 6.48 were observed. These results indicate a solubilization of organic compounds. However, it is necessary to determine volatile fatty acids. Our findings suggest that the inoculum improve the anaerobic digestion of BW.

Table 1. Characterization of the brown water.

Parameter	Concentration (g/L)
pH	6.31± 0.35
Conductivity	1886.5 ± 386.5
COD_t	27.84 ± 5.16
COD_s	9.13 ± 2.64
VS	13.64 ± 4.88
TS	15.96 ± 5.85
VS/TS (%)	85.4

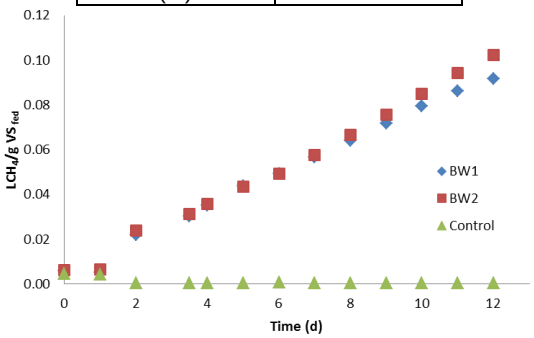

Fig.1 Methane production.

Conclusion. The methane production and solubilization of BW were increased by using granular sludge as inoculum. Our work contributes to understand and improve the separation systems and concentrated effluents treatment.

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