Abstract

Sugar cane agroindustry due to its complex situation confronts several challenges. For example, from 1 ton sugar cane to produce sugar, around 45 kg molasses are produced and from it, 12 L de ethyl alcohol may be produced, generating around 30 to 156 L of a residual liquid effluent known as vinasses that presently are not recycled. This liquid has considerable amounts of organic matter, between 70000 to 150000 mg L-1 measured as chemical oxygen demand (COD) and a pH value of 4.0 that, when compared with domestic sewage with 400 and 800 mg COD L-1, are almost 100-400 times more concentrated. Due to the potential use of these carbon-rich compounds, anaerobic thermophilic degradation experiments have been carried out, using bacterial communities at temperatures higher than 35°C, obtaining an effluent with lower COD contents, with nutrients useful for soils, and producing methane-rich biogas. The objective was to follow up the conversion of carbon compounds measured as COD to methane, new cells, and volatile organic acids in three upflow anaerobic sludge blanket reactors, UASB type, operating at 45, 55, and 65°C. The COD removal was 59%45ºC, 61.5%55ºC, 56%65ºC; carbon compounds trasformed to CH4 was 1.645ºC, 1.855ºC, 1.765ºC L d-1; identified communities in the three reactors were Methanobacterium and Desulfotomaculum, with abundances of 1.5E3 (45ºC), 1.4E4 (55ºC) , and 0.46E2 (65ºC) cells/100 mL, for the first one, and for the second one 0.02E2 (45ºC), 1.2E2 (55ºC), and 1.1E2 (65ºC) cells /100 mL. Concerning the volatile fatty acids data found were 14045ºC, 15655ºC, 14565ºC meq/L bicarbonate. Finally, the control parameter that was used to maintain the stability of the reactors was pH, with values between pH45ºC 7.4±0.20, pH 55ºC 7.5±0.13, and pH 65ºC 7.55±0.23.

Keywords
Sugar cane vinasses, UASB reactors, methane, anaerobic bacteria.