

Effect of Persian Lime on Hydrogen Production from Food Organic Solid Waste

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ABSTRACT

The organic solid waste (OSW) can be used as a substrate for hydrogen production applying a hidrolitic-acidogenic reactor. In Mexican dishes the Persian lime is wide used. The Mexican production of lime in 2013 was 2,095,000 tons approximately. It has been observed that high percentage of lime in OSW can reduce the methane production in ananerobic digestion process. No reports about the effect of lime content in OSW on the hydrogen production in fermentative reactor. For this reason, the objective of this study was to evaluate the effect of different percentages of lime (from 1.25 to 6.25%) in OSW from a restaurant. The waste characterization showed the next composition: fruits and vegetables $38\pm 8\%$ (including a percentage of 15% of lime), meat $10\pm 3\%$, flours 30 ± 8 and other fermentative waste $22\pm 7\%$. Hydrogen production was evaluated in serum bottle test. Inoculum was pre-treated by a thermal shock pre-treatment ($103-105\text{ }^{\circ}\text{C}$ during 1 h). H_2 , CO_2 , methane and Volatile Fatty acids (VFA) were determined by gas chromatography. Kinetics of H_2 production was adjusted to the Gompertz model. The results showed that the hydrogen percentage in biogas comprised between 25 to 60%. The higher H_2 production was observed when 3.1% of lime are present in OSW ($120\text{ mLH}_2/\text{L}_{\text{reactor}}/\text{h}$). In this case the lime was metabolized without any adverse effect. At 6.3% of lime in OSW, showed a decrease in H_2 production. The presence of lime in OSW increase the lag time (96 to 180 h).

Keywords: Bio-hydrogen; lime; organic solid waste.

