

Title: PRE TREATMENT OF WASTEWATER FULL OF LIPIDS WITH ENZYMATIC HYDROLYSIS AND AFTER BIOGAS GENERATION

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Abstract:

The anaerobic digestion for the treatment of wastewater has been employed with the aim of obtaining a higher COD removal rate as compared to other methods of biological treatment. Moreover, the anaerobic degradation of organic matter is to produce biogas, gas fuel that can be converted into thermal, electrical or mechanical energy. The wastewater agribusiness has in its composition lipids, characterized by oil, grease, fats and free fatty acids. Lipids are compounds that cause great harm to the environment, such as the formation of oil films on the surface of water bodies, biomass flotation, toxicity to microorganisms acetogens and methanogens, and foaming due to accumulation of fatty acids not biodegraded. The biological process of anaerobic digestion of waste with high concentrations of lipids is a slow process, with the limiting step to the release of fatty acids by microorganisms with specific lipase activity. With the appropriate choice of the enzyme, is possible to control the products obtained and minimize undesirable side reactions because of the specificity thereof. Faced with this, the lipase enzyme has a great potential for the treatment of effluent rich in lipids given its high specificity and ability to hydrolyze lipids present in these effluents. Therefore, this study aimed to pretreat wastewater rich in lipids with enzymatic action for subsequent anaerobic degradation, increasing the production of free fatty acids in the hydrolysis step without inhibition of methane forming bacteria in anaerobic digestion step. Five reactors were prepared with different concentrations of lipases; the mixtures were acidified to pH 5.0 with phosphoric acid and were incubated at 39 °C for 48 hours and 200 rpm, in response, was obtained with pH, acidity and alkalinity. After the enzymatic hydrolysis, the effluent were prepared as German international standard for anaerobic digestion for the purpose of biogas generation, were verified the volume and composition of the biogas generated. The application of lipase increased amounts of methane in all tests, but the test show that the best results was with 0.75% of the enzyme, which were found 4,056 mgHAc/L of volatile acidity, 44.5% methane and a volume of 1090 mL of CH₄.

Key words: Biogas, effluent, enzyme, hydrolysis, lipids, methane.