DEVELOPMENT OF A HIGH RATE BIOMETHANATION REACTOR SYSTEM:

A PILOT STUDY OF AN INDUSTRIAL WASTE STREAM

By

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DECLARATION

" I certify that this thesis does not incorporate without acknowledge any material previously submitted for a degree or diploma in any university or higher educational institution in Sri Lanka or abroad and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text".

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Abstract

A pilot scale two-phase anaerobic reactor system was constructed and the feasibility of Biomethanation using two-phase systems was evaluated. As the raw materials, a batter mixture washing effluent from a wafer biscuit manufacturing plant was used. This effluent has a high COD due to vegetable fats and oils. Acetogenic reaction was allowed to take place in the first reactor and when the VFA level came to around 12000 mg/l it was fed to the methanogenic reactor. Without an initial seeding of microbial population and a growing media the trial was not successful. So a filter bed was introduced to the second reactor with a 20 liters of methanogenic bacterial sludge from a running reactor. Research trials indicate that the two-phase system works successfully with proper controlling. It also gave out biogas with 84% methane, which is very rich in methane. From these pilot trials, it was able to find out design process parameters for a suitable large-scale two-phase system where the biogas can be generated in large scale with the same waste effluent. These findings help industries to generate energy from their organic waste, hence reducing the dependency on fossil fuels as well as reducing waste disposal problem.

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