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RESEARCH PAPER

High rate anaerobic bioreactors for treatment and energy conversion of organic effluents from agro processing industries

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SUMMARY :

Many food-processing industries cause pollution of air and water if the organic effluents are let out without proper treatment. At the same time, these industries face acute energy shortages. Biomethanation of agro-industrial effluents using high rate bioreactors with cell immobilization techniques is an environment friendly way to combat both these problems. Up-flow anaerobic hybrid reactors (UAHR) for treatment of Cassava Starch Factory Effluent (CSFE) were designed and fabricated with preprocessed coconut shells and PVC pall rings as media. The hybrid design incorporated the UASB and UAF concepts. The performance of the reactors in their ability for pollutant reduction and energy (biogas) production were evaluated by operating the system at different hydraulic retention times (HRT). Similar lab scale bioreactors with coconut shells as well as rubber seed outer shells as matrix could be successfully used for rice mill effluent (RME). Even though a slight inhibitory effect was observed in the case of coconut shells during the start-up the developed UAHRs were found to be effective in pollutant reduction and energy conversion of CSFE as well as RME. A pilot scale UAHR was also installed for biomethanation of waste coconut water from a coconut mill. The cost reduction achieved by replacement of synthetic media with locally available natural materials and the simple design coupled with high treatment efficiency and biogas production ability offers great scope for energy conversion of agro-industrial effluents.

KEY WORDS : Biomethanation, Cell immobilization, Upflow anaerobic hybrid reactor, Agro-industrial effluent

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