



Optimization of process factors for the efficient generation of biogas from raw vegetable wastes under the direct influence of plastic materials using Taguchi methodology

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ABSTRACT

In this investigation, the combined process efficiency with respect to biogas generation was evaluated by Taguchi robust design using raw vegetable wastes (RVW) and waste plastics (WP) as the key components. The signal-to-noise (S/N) ratio was used to estimate the main effects, interaction effects, and optimal levels of the process factors. Among the various experimental combinations, statistical analysis of the optimized result showed that enhanced biogas production could be achieved with the plastic content (15%), height to diameter (h/D) ratio (30), water content (125 ml), and digestion period (18 week). The Taguchi methodology predicted a maximum biogas (24.83 m³/ton of RVW) could be generated with those selected process parameters under optimized condition. The experimental data showed that enhanced biogas production (24.16 m³/ton of RVW) was found with the optimized conditions.

Keywords: Raw vegetable wastes; Waste plastics; Biogas; Taguchi robust design; Hydrolyzed material

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