

## **ABSTRACT**

Optimization was done by investigating the interaction effects of total solids, mesophilic temperature, and substrate retention time on biogas production in a batch biodigester. The volume of the biodigester was 0.15m<sup>3</sup>. Central composite design of Response Surface Methodology was used to design the experiment. Total solid levels were varied from 6.31% to 9.68%, temperature was from 26.59°C to 43.41°C, and substrate retention time was from 9.95 to 20.04 days. Analysis of results was done using Design Expert software statistical package (version 10.0.0.3). It gave a coefficient of determination of 0.9665 which indicated a high correlation between the variables. All the variables had a significant effect. The highest biogas production rate of 75.41litres/day (or 0.50 m<sup>3</sup> of biogas per m<sup>3</sup> of digester volume per day, m<sup>3</sup>/m<sup>3</sup>d) was achieved at a level of 8% total solids, a temperature of 43.41°C, and a substrate retention time of 15 days.

### **Keywords**

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