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Performance Operation of a Greenhouse Biogas Digester

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South Africa is faced with an energy crisis as it relies more on energy from fossil fuels. The use of Renewable energy technologies can be a solution to current energy crisis in South Africa leading to continuous load shedding. Waste-to-energy conversion is playing a significant role in advancing economic development and health quality in society. One of the technologies that exploit waste-to-energy conversion is biomass technology. Renewable energy biogas from biomass can be used for electricity generation, heating, lighting purposes and fuel for vehicles. For optimum biogas production, solar energy can be used to provide suitable digester temperatures. In this research, a portable plastic biogas digester housed inside a greenhouse cavity was assembled and fed with cow dung. The pH, ambient temperature, slurry temperature, and temperature inside the greenhouse cavity measured taken daily. The biogas yield was measured by the serial residential (SR) diaphragm biogas flow meter, and the methane composition was measured with the use of the SAZQ biogas analyser. The influence of temperature on biogas fermentation was investigated in the study. A heat transfer model of biogas fermentation was built based on the project and as a result the influence of temperature on biogas fermentation was investigated in the study. The results depicted that the gas production rate of biogas fermentation increases with the increase of temperature within a certain range, and the maximum biogas production occurred when the pH was in the range of 6.84 to 7.03. The methane composition of the biogas was above 50%. it was observed that a digester housed inside a greenhouse envelope can keep the slurry temperature in the optimal mesophilic temperature range of 34oC –36oC, which is ideal for anaerobic digestion.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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