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Design of biomass digester and its performance analysis using local raw materials

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This paper reports on the generation of biogas using cow dung. A 0.0413 m³ plastic bio-digester with a capacity of 50 kg was designed, constructed, and used to obtain biogas from this waste. The waste was charged into the digester in a one to one ratio (1:1) with water, which being 18.75 kg of waste mixed with 18.75 kg of water giving a total 37.5 kg. The digestion of the slurry was undertaken in a batch operation. All of the parameters necessary for gas production like pH, temperature, Total Viable Count (TVC) and gas volume were monitored and recorded. The waste started producing combustible gas five days after it was charged. The waste was kept in the digester for a retention time of 28 days. The conditions within the digester suitable for the anaerobic microbes were under mesophilic temperatures (20-45 °C). The waste started producing combustible gas five days after it was charged. The maximum volume of biogas obtained from the wastes was 7.1 litres on the tenth day. The volume of gas produced throughout the digestion period was determined using the downward displacement of water technique. Changes in level of water from a predetermined reference level were observed in a transparent, inverted and calibrated bucket due to inflow of the biogas and were recorded on a daily basis. The cumulative gas production was 156.5 litres on the twenty eighth day, after which the experiment was terminated. This digester is, therefore, recommended for commercial production.

Biography

Osueke G O attended St Patrick School, Abueke where he obtained the first School Living Certificate with distinction in 1964 and his West African School Certificate from Ibeku High School, Umuahia in 1974. He then went to Government College, Afikpo, for his advanced level in Sciences and also served as College Captain for IBIAM House. He went on to be one of the pioneer students at Petroleum Training Institute (PTI) permanent site, Efurum, Warri, where he bagged PTI Diploma in Petrochemicals (1977- 79). His outstanding performance earned him automatic employment with NNPC in 1980 and was one of the pioneer indigenous Technologist at the Kaduna Refinery/PPL. He continued his education two years later at Texas Southern University in Houston, USA and Texas A & M University, Prairie View where he bagged BSc (Cum Laude) in Industrial Engineering and MSc Industrial Engineering, respectively. While in USA, he was the Founding Member of the famous "Nigerian Foundation" which they registered in Houston, Texas in 1982. He won the prestigious National Dean's list honor in USA in 1982.

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