

ABSTRACT

OPTIMIZATION OF BIOGAS PRODUCTION FROM WASTEWATER OF CASSAVA-BASED BIOETHANOL INDUSTRY THROUGH TEMPERATURE ENHANCEMENT AND MICRONUTRIENT ENRICHMENT

By

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Each litre of ethanol produced in the ethanol industry generates 20 litres of wastewater. Wastewater from raw cassava-based industry has Chemical Oxygen Demand (COD) of 35,000 – 50,000 mg/L. Wastewater with such characteristic is suitable to be processed in an anaerobic fermentation system. So that PT Medco Ethanol Lampung (MEL) has implemented the system at their Waste Water Treatment Plant (WWTP). But WWTP biogas reactor's performance at PT MEL has not been optimum. This can be seen from the performance of COD removal which is only 60-70%, volatile acids content of the effluent is still high (3500-4500 mg / L) and the degradation rate reaches only 20-30%, and methane production is still relatively low, and the biogas reactor's performance needs to be improved.

The purpose of this research was to improve the performance of anaerobic bioreactor to produce biogas with treatment temperature and micronutrient enrichment. Four different types of treatment in the bioreactor were used, they

were ; (1) temperature 35°C without micronutrient enhancement, (2) room temperature without micronutrient enhancement, (3) temperature 35°C with micronutrients enrichment, and (4) room temperature with micronutrient enhancement. Micronutrient were added consisting of 40 mL / L Fe, 37.5 mL / L Ni; 41.67 mL / L Co; and 25 mL / L Mo. The obtained data were shown in the form of tables and graphs and discussed descriptively. The volume of each bioreactor was 2 L and fermented with retention time of 40 days. The parameters observed were done on the pH value, Total Solid (TS), Total Suspended Solid (TSS), Volatile Suspended Solid (VSS), Chemical Oxygen Demand (COD), and Volatile Fatty Acid (VFA).

Enrichment of micronutrients resulted in less residue VFA, increase the COD removal up to 85,70 %; 0,274 g COD removal/g VSS 85.70%; TSS 4,061.25 mg / L. While the 35°C treatment has been shown to be unable to improve the performance of microorganisms in degrading organic matter in the wastewater.

Keywords: Bioethanol waste water, micronutrient, biogas