Thesis Title	Effect of Supplementary Nutrients on Biogas Production of Decanter Cake
	from Palm Oil Mill Industry at Thermophilic Condition
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Abstract

The objective of this research was to study the effect of supplementary nutrients on biogas production of decanted cake from palm oil mill industry at thermophilic temperature (55°C). Four lab-scale anaerobic sequencing batch reactors were used in this investigation; namely, thermophilic temperature without nutrient supplementation (R1), thermophilic temperature with Fe, Ni and Co supplementation (R2), thermophilic temperature with Speece's formula supplementation (R3) and mesophilic temperature without nutrient supplementation (R4). Each reactor had a working volume of 2 liters, hydraulic retention time of 10 days and was operated at organic loading rate of 0.5 - 3 kg COD/m³.d. The seed sludge had TVS concentration of 10,000 mg/l. The reactor performance was evaluated in terms of COD removal, biogas production rate and methane production rate. When the organic loading rate was controlled in a range of $0.5-3 \text{ kg COD/m}^3$.d, the results showed that all reactors had COD removal of higher than 90 percent. At organic loading rate of 3 kg COD/m³.d, R1 - R4 had biogas production rates of 0.69, 0.68, 0.79 and 0.61 L/L-d with the methane content of 54.30, 57.77, 60.22 and 50.69 percent, respectively. The results showed that supplementary nutrients and thermophilic temperature significantly affected biogas production. After 190 days of operation, the quality of bacteria in terms of Specific Methanogenic Activity (SMA) in thermophilic with Speece's formula supplementation reactor (R3) increased slightly.

Keywords : Supplementary nutrient / Thermophilic / Mesophilic / Decanter cake / Anaerobic SBR