

OPTIMIZATION OF BIOGAS PRODUCTION IN THE SEWAGE TREATMENT PLANT BY USING CENTRAL COMPOSITE DESIGN (CCD).

Mohd Faizan Jamaluddin¹, Nurul Shareena Aqmar Mohd Sharif¹, and Norazwina Zainol¹

¹Universiti Malaysia Pahang

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Abstract

Most digesters in industrial-scale operate in deficient level and almost nominal due to inefficient process. Optimization of the process may rectify the issue but required a valid method that does not just improve the process yet able to unravel the eventuality of the intricate process if the adjustment needed. A proper tool is required. The central composite design (CCD) was implemented in this study to investigate the suitability of this tool for optimization of anaerobic digestion (AD) process. The main effect of pH and HRT studied in CCD acquired from the screening process show the importance of having neutral pH value and long retention period for a better biogas yield. The process with pH 7.0 and HRT 15.7 days, IP 33%, TS 4% and FR 4% found to be the optimum setting for the process. The new setting successfully improved the production output up to 60% compared with baseline (existing setting), while allowing 50% more sludge to be processed. The X2 goodness-of-fit test indicates that the mathematical model applied in this study is valid at 95% of confidence level with R2 of 0.9. The results presented in the paper demonstrate the reliability of CCD as optimization tools for AD process in the industrial scale sewage treatment plant (STP).

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