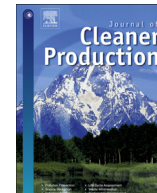




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The combined effect of ultrasonic and microwave pre-treatment on bio-methane generation from co-digestion of petrochemical wastewater



Md Nurul Islam Siddique^{*}, Mimi Sakinah Abdul Munaim, Zularisam Bin Abdul Wahid

Faculty of Engineering Technology, University Malaysia Pahang (UMP), Lebuhraya Tun Razak, 26300, Gambang, Kuantan, Pahang, Malaysia

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ABSTRACT

This work investigates the combined influence of ultrasonic and microwave pre-treatment on bio-methane generation from anaerobic digestion of petrochemical wastewater and waste activated sludge. The results revealed that co-digestion of waste activated sludge with petrochemical wastewater produced approximately 0.22 L CH₄/g VS_{added}. However, the highest bio-methane generations from individual digestion of petrochemical wastewater and un-pretreated waste activated sludge were 0.19 and 0.17 L CH₄/g VS_{added}, respectively. In addition, co-digestion enhanced bio-methane generation by 18%–32% relative to individual digestion of the wastes. Using microwave and ultrasonic pre-treatments on the waste sludges before the co-digestion process resulted in supplementary enhancement of bio-methane generation by 53% and 25%, respectively, relative to co-digestion with un-pretreated waste activated sludges. The maximum biogas and bio-methane productions, 0.47 L/g VS_{added} and 0.33 L CH₄/g VS_{added}, were attained from the co-digestion of 30-min microwave pre-treated waste activated sludge and petrochemical wastewater, respectively. The scientific contribution of the present work on the influence of microwave pre-treatment may play a role in the development of an energy-efficient strategy for waste management.