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Biogas potential of deinking sludge from wastepaper recycling industry: Influence of dewatering degree and high calcium carbonate content

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Statement of problem: The wastepaper recycling industry produce different residues, among which is the deinking sludge (DS). The DS is generated from the deinking process and constitutes a major fraction of the residues generated by the European pulp and paper industry. The traditional treatment of DS by incineration is capital intensive due to energy requirement for dewatering and the need for complementary fuel source due to DS low calorific value. This could be replaced by a biotechnological approach. This study therefore investigated the biogas potential of different DS streams (different dewatering degrees) and the influence of its high calcium carbonate content of DS on its biogas potential.

Method: Dewatered DS (solid fraction) sample from filter press and the filtrate (liquid fraction) were collected from a partner wastepaper recycling company in Germany. The solid fraction and the liquid fraction were mixed in proportion to realize DS with different water content [55 – 91% Fresh Mass]. Spiked samples of DS using deionized water, cellulose and calcium carbonate were prepared to simulate DS with varying calcium carbonate content [0–40% Dry Matter]. Biogas potential was studied using a 1-Liter batch test system under mesophilic condition and ran for 21 days.

Results and Conclusions: A specific biogas potential in the range 133- 230 NL/kg organic dry matters was observed for DS samples investigated. An optimal dewatering degree corresponding to a water content of about 70% fresh mass was identified for the biogas production of DS. No inhibitory influence was observed in the biogas potential of spiked DS samples due to the reported high calcium carbonate content of DS. This study confirms that DS is a potential bioresource for biogas production. Further optimization such as Nitrogen supplementation due to DS high C/N ratio can increase biogas yield.

Recent Publications

1. Amare D, Ogun M K and Ina K (2019) Anaerobic treatment of deinking sludge: Methane production and organic matter degradation. *Waste Management* 85:417-424.
2. Steffen F and Saake B (2017) Valorization of waste streams from deinked pulp mills through anaerobic digestion of deinking sludge. *Bio Resources* 12(3):4547- 4566.
3. Kinnunen V, Ylä-Outinen, A and Rintala J (2015) Mesophilic anaerobic digestion of pulp and paper industry bio sludge–long-term reactor performance and effects of thermal pretreatment. *Water Research* 87:105-111.

Biography

Moses Ogun has his expertise in Environmental Technology. He is a Research Engineer at the Hamburg University of Technology. In his last research he worked on the photocatalysis of recalcitrant organics in wastewater effluent. For over four years now he has engaged himself in finding alternative approach for the treatment of deinking sludges produced by the wastepaper recycling industry. His strategies are mainly biological approach and reuse options.

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