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Mesophilic anaerobic co-digestion of Source Separated Organic Waste (SSO) with Thickened Waste Activated Sludge (TWAS) for improving biomethane production

Anahita Rabii, Saad Aldin, Yaser Dahman and **Elsayed Elbeshbishy**
Ryerson University, Canada

Waste generation and energy crisis are among the most important global issues. Municipalities are facing increasing challenges regarding management and disposal of Municipal Solid Waste (MSW) which includes a range of organic and inorganic materials. Source Separated Organic Waste (SSO) refers to the combination of the MSW organic fraction from residences, industrial, commercial, and institutional (ICI) sector. According to Environment Canada, almost 40% of residential waste consists of organic waste. Municipalities are not able to achieve diversion targets above 50% without establishing residential organics collection program. On the other side, sludge handling is responsible for the major fraction of the operating costs of a municipal wastewater treatment plant. Anaerobic digestion (AD) has been in consideration as a sustainable option for waste management and for being a renewable energy source. AD technologies have shown adaptability to a range of different feedstocks. Various sources of waste such as the organic fraction of municipal solid waste, agricultural waste, animal wastes, and sewage sludge can be utilized as feedstocks to digesters. Anaerobic co-digestion, which entails the simultaneous digestion of two or more feedstocks has shown to be beneficial for its economic viability, increasing methane yields, and its capability to alleviate some of the problems emerging in mono-digestion. This research was aimed to investigate biomethane production from anaerobic co-digestion of SSO and Thickened Waste Activated Sludge (TWAS) via BMP assay. Co-digestion of TWAS and SSO was conducted at different mixture ratios in mesophilic condition. The results indicated that co-digestion of TWAS/SSO at the mixture ratio of 1:9 resulted in 70% and 38% cumulative methane increase compared to conventional digestion of TWAS and SSO alone respectively. The maximum methane yield of 216mL CH_4/gTCOD added was obtained by TWAS/SSO co-digestion at the mixture ratio of 1/9.

Biography

Anahita Rabii is a 4th year PhD candidate in civil engineering at Ryerson University. She has her expertise in water and wastewater treatment technologies, pollution monitoring and control, and resource recovery through working in both industry and academia. She is currently conducting her research on developing a model for anaerobic digestion of multi feedstocks. Various waste materials can be utilized as feedstocks for digesters. Anaerobic digestion is able to produce biogas comprised mostly of methane which provides a renewable energy source.

anarabii@ryerson.ca

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