**Project:** Effects of Temperature on Anaerobic Thermophilic Sludge Treatment  
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**Sponsor(s):** None yet

**Summary:** Ever since the 1992 passage of 40 CFR 503 sludge disposal and reuse regulations for wastewater-treatment plants, there has been a strong interest in the beneficial reuse of treated sludge as biosolids in the United States. Currently, the most widely adopted method of sludge treatment by anaerobic digestion can only generate Class B product sludge which cannot be reused as biosolids without site and application restrictions. The higher quality Class A sludge product can be generated from thermophilic digestion. This Class A sludge product can then be reused as a commercially viable biosolids without any restrictions. However, the EPA does not list among its “processes for further reduction of pathogens” (PFRPs) single-stage anaerobic thermophilic digestion, citing that it is an unstable process, although later studies have shown that this is no longer true. Standard thermophilic digestion has been traditionally operated at the arbitrarily set temperature of 55±2°C. It is the direct aim of this experiment to examine effects of operating anaerobic digestion at the increased temperature of 65±2°C as compared with traditional thermophilic operating temperature of 55±2°C. Our motivation to study thermophilic anaerobic digestion at elevated temperatures stems from the fact that at increased temperatures rate of organic destruction increases significantly. In addition, better pathogen reduction can be achieved at 65±2°C as opposed to55±2°C. The result of elevated temperature then should ideally be a higher quality end product that could be used as a commercial biosolids. Added advantages of the thermophilic bacteria processing sludge at elevated thermophilic temperature is an increase in methane generation.

In the current ongoing experiment, two 3-liter effective volume laboratory-scale reactors receiving a 1:1 mixture of primary sludge and waste activated sludge are being operated in a semi-continuous (daily draw-fill) mode without the recycling of biomass. Continuous mixing is provided by a mechanical mixer on one reactor and a shaker on the other reactor. Both reactors started with inoculum procured from the anaerobic digester operated at the Phoenixville Wastewater Treatment Plant, Phoenixville, PA. The sludge feed was prepared by blending 1.5 liters of primary sludge and 1.5 L of waste activated sludge also provided from the Phoenixville Wastewater Treatment Plant, Phoenixville, PA. When these two reactors reach a steady-state condition, they will be analyzed for total and volatile suspended solids, rate of total gas and methane production, pH, and COD reduction rate. Microbiological parameters to be assessed are fecal coliform density and *Salmonella* density. These parameters will give an accurate depiction of the thermophilic digesters’ efficiency as well as the quality of the end product. This will allow us to compare thermophilic anaerobic digestion at elevated temperatures to that at 55°C.

**Publication(s):** None yet