

Sludge dewaterability: improved tools for the emerging biotech industries

“Very pleased to have gained some experience with our new CST device. Further, to have looked at dewaterability tests beyond the main market of sewage sludge dewatering. We are very keen to build on this project and have many ideas about how to exploit the excellent early results.”
- Julian Tapp, Triton Electronics Ltd.

The Project

Processing of wastewater biosolids is a major issue for the water industry, typically accounting for half the cost of wastewater treatment. This is due to both the volume and the nature of the material: sludges are complex biological substances capable of holding large amounts of water via different mechanisms.

The capillary suction time (CST) is one key parameter used to assess sludge dewaterability. Separation of liquids and concentration of the solid fraction can have very significant benefits both on transport costs and impacts, and on the organic loading rates that can be applied to digestion plant and infrastructure.

Other bioprocesses developed rapidly for the circular bioeconomy, such as anaerobic digestion, offer new opportunities and challenges for dewaterability analysis. This is due to the introduction of new feedstocks - such as food and agro-wastes, and of new treatments - including low-temperature anaerobic processes and biorefinery fermentations.

In collaboration with Triton Electronics, the international market leader on CST apparatus for decades, this project analysed a range of samples from wastewater treatment works, commercial anaerobic digestion plants and laboratory-based bioreactors. Factors affecting CST test repeatability included alternative test apparatus models and parts, test conditions and physicochemical and biological parameters of samples. Its comparability with other dewaterability test methods was also investigated (mainly regarding frozen image centrifugation and specific resistance to dewatering).



The digestate (left) from wastewater biosolids has a relatively low solids content. Other digestates from food and agro-wastes (right) have higher solids content and different rheological properties which make dewatering more challenging

The results have demonstrated that most commercial anaerobic digestate samples showed very different properties from the familiar waste activated sludge produced from wastewater biological treatment process in wastewater treatment works, and different testing protocols need to be investigated for future real-world applications.

“It has been a great pleasure working with Triton on this project to explore the challenges and R&D needs for the dewaterability test methods on digestate and other emerging materials. The results obtained and the discussion carried out during the project have formed a solid basis for the future collaboration with Triton.”



Dr Yue Zhang, University of Southampton