

Tracking sludge flow for better wastewater treatment and more biogas

April 1 2019

A new way of tracking how sewage sludge flows during thermal treatment could help engineers design better wastewater treatment plants and boost production of biogas.

Researchers at RMIT University in Melbourne, Australia, demonstrated how the flow behaviour of [sludge](#) can be used as a tool to gauge how quickly [organic matter](#) is dissolving at high temperatures, paving the way for online monitoring of process performance.

Traditional methods of assessing the performance of thermal treatment require time-consuming sampling and [chemical analysis](#).

But rheology calculations—which measure and detail how liquids flow—can be done online in [real time](#).

The study, published in *Water Research*, found a correlation between how sludge dissolves and changes in its flow behaviour, indicating it may be possible to monitor thermal treatment performance simply by tracking the flow.

Lead investigator Associate Professor Nicky Eshtiaghi, from the School of Engineering, said correctly estimating the rheological parameters of sludge is critical to efficient process design.

"Our technique enables engineers and plant operators to conveniently obtain these parameters without having to perform the measurements at

[high temperatures](#) themselves," Eshtiaghi said.

"We hope the research encourages more serious consideration of flow behaviour in optimising and designing high pressure and high temperature sludge-handling processes."

The equations in the study are based on direct measurement of sludge at conditions that mimic real-world thermal treatment processes.

The new technique can measure flow behaviour without destroying the samples, often a big challenge during data collection of concentrated sludge.

Thicker sludge, more biogas

The study also showed that varying the thickness of sludge has little impact on the effectiveness of thermal treatment.

This means plant operators could increase biogas production downstream, by increasing the solid content of sludge during initial treatment processes.

"Thicker sludge can be beneficial for both optimising efficiency overall and for producing more biogas," Eshtiaghi said.

"With our discovery that the thickness of sludge makes no difference, this research gives plant operators more flexibility in designing processes that can better exploit the renewable energy potential of wastewater sludge treatment."

Eshtiaghi, a member of the Water: Effective Technologies and Tools (WETT) Research Centre at RMIT, said the research could enable more efficient design and trouble-shooting of pumps, mixers and heat

exchangers in the sludge [treatment](#) process.

More information: Kevin Hii et al, Rheological characterization of thermal hydrolysed waste activated sludge, *Water Research* (2019). [DOI: 10.1016/j.watres.2019.03.039](#)

Provided by RMIT University

Citation: Tracking sludge flow for better wastewater treatment and more biogas (2019, April 1) retrieved 23 April 2024 from <https://phys.org/news/2019-04-tracking-sludge-wastewater-treatment-biogas.html>

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