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4.07.P-Mo352 Effect of Thermal Hydrolysis on the Behaviour of Target Organic Micropollutants in Sewage Sludge

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Growing concerns about organic micropollutants (OMPs) in sewage sludge (SS) are affecting its management strategy and disposal practices. Whilst, recovering nutrients and organic matter from digested SS for agricultural use is widely considered a positive contribution to the circular economy. One of the main concerns is that OMPs, such as pharmaceuticals, antibiotics and pesticides, may negatively affect environmental and human health when digested SS is used in agriculture.

Several pre-treatment technologies have been developed to stabilise and hygienise SS, to improve its dewatering and to facilitate its final disposal. Among these, the thermal hydrolysis process (THP) has proven effective in improving methane production in SS digestion, digestate dewaterability and pathogen removal. However, the fate of OMPs during and after THP is not yet fully understood. Some pollutants might degrade during the treatment, others might react with the present organic compounds.

This study investigates the behaviour of three target OMPs during THP, operated at temperatures of 160-200 °C, simulating the conditions in commercial THPs for sludge pre-treatment prior to anaerobic digestion. The persistence of the target OMPs will be assessed with analytical methods in both water with representative organic compounds and spiked SS samples, to understand the differences in the adsorption of different OMPs, characterised by comparable chemical properties. Moreover, the biochemical methane potential of the treated samples will be determined to assess the final biodegradation of the formed and/or residual compounds. We hypothesize that the OMPs will be better reduced after thermal treatment, because they will be (partially) degraded at the high temperatures, or they will be desorbed from the solid

sludge particles becoming available for biodegradation. Additionally, the desorbed compounds may react with other organic matter. The experimental results on the persistence of the thermally treated target compounds will be presented, along with findings from experiments using sewage sludge spiked with these three compounds and exposed to THP conditions.

By focusing on the potential interactions of the OMPs with recalcitrant organic compounds present in SS during the treatment, this research could pave the way for an improved (thermal) treatment process for SS that will also address the removal of OMPs and enhance the potential for direct reuse of the solid or liquid fraction.

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