

Title: Regeneration of Powdered Magnetic Activated Carbon

Abstract:

With the detection of organic micropollutants such as pharmaceuticals and chemicals from personal care products in treated municipal wastewater, a new problem presents itself. These compounds being adulterants within natural ecosystems pose their own risks and may lead to harmful impacts on local life forms including humans. Elimination of these substances at point sources such as wastewater treatment plants seems to be a viable option where different technologies may be deployed to achieve this objective. One such technique is the use of an adsorption mechanism as a later stage treatment option at these plants. Superparamagnetic powdered activated carbon (MAC) is an adsorbent which may readily accumulate a wide range of these aforementioned compounds and then be efficiently settled due to its intrinsic response to a magnetic field. To further improve the application of MAC, a method of regenerating this adsorptive potential is sought after. The following work aims to regenerate superparamagnetic activated carbon through electromagnetic induction and observe the effects of this process on its capacity to adsorb organic micropollutants. The MAC was initially loaded with secondary clarifier effluent from a municipal wastewater treatment plant and then subjected to the electromagnetic induction process. A significant regain in adsorption potential was observed across all tests through the monitoring and control parameters of UV254 spectral absorbance and dissolved organic carbon. Finally, gas chromatography coupled with mass spectrometry (GC-MS) was performed to precisely observe the degree of removal for characteristic organic micropollutants by MAC adsorption and subsequent electromagnetic inductive regeneration.

Regards,
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WAREM-2018