



Remove micropollutants with granular activated carbon?

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Topics: Wastewater | Pollutants

Eawag researchers investigated this question in two extensive pilot studies at the Furt-Bülach and Glarus wastewater treatment plants. The findings: Granular activated carbon filtration efficiently removes micropollutants, is technically feasible and is an equal alternative to other processes.

For the elimination of trace substances at wastewater treatment plants (WWTP), granular activated carbon (GAC) is also available as an alternative treatment option to ozonation and the powdered activated carbon process (PAC).

In contrast to the high energy consumption in ozonation (electrical energy to generate ozone and liquid oxygen), the energy-intensive production and CO₂-footprint of carbon (starting raw materials, process energy) have an impact on activated carbon treatment. The main advantage of using activated carbon is that, unlike ozonation, the micropollutants are not oxidised but adsorbed and thus no transformation products are formed. The use of activated carbon can also achieve a significant DOC (dissolved organic carbon) reduction in the effluent of the WWTP, which can be an additional advantage when upgrading or retrofitting the wastewater treatment plant.

Pilot studies show: GAC efficiently removes micropollutants

With two pilot studies now summarised in the current A&G at the Furt-Bülach and Glarus WWTPs, Eawag, in collaboration with many partners, has been able to demonstrate that the process of space filtration with granular activated carbon is suitable for efficiently removing micropollutants from municipal wastewater while complying with statutory requirements. GAC filtration is technically and economically

feasible (specific operating costs) and has proven to be practical. "In our tests, GAC filtration has proven to be a very robust and easy-to-handle technology. It is very similar in operation to the established sand filtration at wastewater treatment plants," explains Marc Böhler from Eawag's process engineering department. "For individual WWTPs, pre-ozonation can also be a useful addition," adds Böhler.

The elimination performance achieved and the service lives or bed volumes that can be reached also make it clear that the specific activated carbon requirement is comparable to powdered activated carbon (PAC) processes. Böhler: "GAC filtration also has a significantly better CO₂ footprint than PAC processes thanks to the possibility of reactivating the activated carbon used."

Cover picture: J. Fleiner

Aqua & Gas article, January 2022 edition

Böhler, M. A.; Joss, A.; McArdell, C. S. (2022) GAK-Filter für die Spurenstoffentfernung. Erfahrungen und Betriebsergebnisse der Pilotstudien ARA Furt/Bülach und Glarnerland, *Aqua & Gas*, 102(1), 48-54, [Institutional Repository](#)

Project reports

Glarus

McArdell, C. S.; Böhler, M.; Hernandez, A.; Oltramare, C.; Büeler, A.; Siegrist, H. (2020) Pilotversuche zur erweiterten Abwasser-behandlung mit granulierter Aktivkohle (GAK) und kombiniert mit Teilozonung (O₃/GAK) auf der ARA Glarnerland (AVG). Ergänzende Untersuchungen zur PAK-Dosierung in die biologische Stufe mit S::Select®-Verfahren in Kom, 146 p, [Institutional Repository](#)

Bülach

Böhler, M.; Hernandez, A.; McArdell, C. S.; Siegrist, H.; Joss, A.; Baggenstos, M. (2020) Elimination von Spurenstoffen durch granuliert Aktivkohle-Filtration (GAK). Grosstechnische Untersuchungen auf der ARA Furt, Bülach. Schlussbericht, 135 p, [Institutional Repository](#)

GAC Consensus papers

Böhler, M.; Joss, A.; McArdell, C.; Meier, A. (2020) Hinweise zur Planung und Auslegung von diskontinuierlich gespülten GAK-Filtern zur Elimination organischer Spurenstoffe aus kommunalem Abwasser. Konsenspapier zum Ergebnis des Workshops vom 9.12.2019 an der Eawag, 5 p, [Institutional Repository](#)

Böhler, M.; Joss, A.; McArdell, C.; Meier, A. (2020) Notice explicative pour la planification et le dimensionnement de filtres à charbon actif en grains (CAG) rétrolavés discontinuellement pour l'élimination des composés traces organiques dans les eaux usées communales. Document de synthèse suite au worksho, 5 p, [Institutional Repository](#)

Funding / Partnerships

The projects were supported by a variety of institutions such as the Federal Office for the Environment, cantonal agencies, engineering firms, plant constructors and wastewater associations.

Related Files

[Aqua & Gas article in the January 2022](#) [pdf, 3 MB]

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<https://www.eawag.ch/en/info/portal/news/news-archive/archive-detail/remove-micropollutants-with-granular-activated-carbon>