Feasibility enhancement PACAS through dosing of Fe

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Dutch Innovation on Micropollutants Removal from Municipal Wastewater

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Technology

- PhD thesis*:

  Powdered activated carbon (PAC) adsorption is a removal process for pharmaceuticals and other pollutants. Studies show that addition of Fe species can improve the performance of PAC adsorption.

- Fe is dosed at wwtp's in NL for P-removal

→ Is it feasible to enhance Powdered Activated Carbon in Active Sludge (PACAS) through dosing of Fe?

* Anaerobic manganese- of iron-mediated pharmaceutical degradation in water, PhD-thesis, Wenbo Liu 2018)

Technology

- Expected benefits:
  - Removal of micro's equal to PACAS with lower PAC usage
  - Additional P removal

- Knowledge gaps:
  - Removal principle
  - Which type of Fe and how to prepare Fe-PAC
  - Quantification of benefits

Feasibility Study

- Literature study about removal principle:
  - Hybrid absorbents of activated carbon and iron oxides (Fe-PAC)
  - The iron oxides are mainly immobilised in the pores of the activated carbon.
  - Enhanced removal by surface coordination of the functional groups of the iron oxides (-OH) in the Fe-PAC and the functional groups in the removed substances.

- Lab research (September 2019 – February 2020)

Results

Criterium	Score in respect to PAC in activated sludge
Removal of micropollutants	0
CO2 footprint	+
Costs	+
Ecotoxicity	0
Microplastics	0
Antibiotic resistance	0

Further research

- Lab research by WUR (MSc thesis):
  - Preparing of Fe-PAC (e.g. type of Fe, iron-loading technique on PAC)
  - Removal efficiency of micropollutants by Fe-PAK
  - Effect on DOC concentration

- Finish feasibly study by determining the criteria costs, CO_2 footprint and removal efficiency.

Thank you for your attention!

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