

Remediation of PFAS in groundwater

PFAS (per- and polyfluoroalkyl substances) consist of a large group of longer and shorter chained synthetically produced fluorine substances that have been used since the early 1950's. PFAS have been used in everything from food packaging, fire extinguishing foam to surface treatment and impregnation of textiles, carpets and in paint. The substances are called "forever chemicals" due to their characteristics as extremely stable and hardly degradable. In addition, they are very water soluble and therefore can end up in our groundwater.

PFAS are undesirable in the environment, and they are under suspicion of being endocrine disrupting, carcinogenic and capable of destroying the immune system.

PFAS poses significant challenges to the remediation industry due to extremely low regulatory limits and highly stable carbon-fluorine bonds. Many of the present available methods can remediate longer chained PFAS-compounds, but does not include the short-chained compounds.

The aim of this project is to develop a cost-effective method for the remediation of groundwater contaminated with PFAS compounds. The method aims at full destruction of PFAS compounds using a combination of concentration of the compounds from groundwater followed by a complete destruction by an advanced oxidation process (AOP).

To concentrate the PFAS compounds, a waste product (e.g. wheat straw, bone meal, sugar beet molasses or wood) is used. The waste products are converted to biochar, which is cheaper and more sustainable than traditional activated carbon. The concentrated PFAS compounds can then be broken down by photodegradation with UV light in a "cost effective" way. After the PFAS compounds have been degraded, it is possible to regenerate and reuse the adsorptive photocatalyst for several cycles.

The "Proof of concept" demonstrated in this project will provide a crucial first step and a strong foundation for the complete removal of PFAS in groundwater and drinking water treatment facilities and meet the goal of zero fluoride contamination. It is therefore a promising and environmentally friendly development project to build a concept for remediation of PFAS-contaminated groundwater.

The developed method will provide consultants and the regions with a "cost-effective" and sustainable method for effective destruction of PFAS in the environment.

Experiments are carried out at Copenhagen University, KU and Aarhus University, AU, which ensures a targeted and high professional level. The participation of Geosyntec ensures that knowledge from the USA is also included.

COWI and Geosyntec will assure that the experiments carried out at the universities stays on track and is developed to a practical usable method.