area of expertise

PerfluorAd

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Purification of water contaminated with PFCs is both technically efficient and economical when PerfluorAd is used.

Stirring reactor plant for cleaning PFC-contaminated water with PerfluorAd

The PFC challenge

The compound class of Perfluorinated and Polyfluorinated Chemicals (PFCs) comprises an extensive group of closely related chemical compounds that were manufactured in large quantities over the course of several decades.

Two of the best known PFCs are Perfluorooctane Sulfonate (PFOS) and Perfluorooctanic Acid (PFOA), often also known as Perfluorinated Tensides (PFT).

These PFTs are fluorinated organic compounds in which the hydrogen atoms of the hydrocarbon skeleton are substituted fully by fluorine atoms. For this reason, they are among the strongest organic compounds and thus considered non-degradable because they persist for a long time in the environment. Their toxicological importance should not be underestimated.

The limits of conventional purification processes

To date, adsorption (generally on activated carbon) was the only technically feasible method to treat PFC-contaminated water. However, PFCs are typically considered to absorb rather poorly as the residence time required within the activated carbon filters renders the process impractical and costly.

Since 2006, Cornelsen Uwelttechnologie GmbH has been exploiting its extensive experience in the design and implementation of water treatment technologies to research and trial a range of readily available adsorbents and ion exchangers for the treatment of PFC contaminated water. It became obvious that development of a technically more efficient and economical process is required. In cooperation with the Fraunhofer Institute UMSICHT based in Oberhausen, Germany, Cornelsen has developed “PerflourAd”. PerflourAd is a novel active ingredient for the efficient and cost effective treatment of PFC contaminated water.

Extended column test installation

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The advantages of the PerfluorAd system

Typically PFCs are treated with conventional granular activated carbon within pressurised vessels. Once within these vessels the treatment process within can no longer be influenced. Cornelsen's **PerfluorAd** ingredient on the contrary is injected as a liquid into the flowing water within a stirring reactor vessel.

The liquid form of the ingredient leads to a high degree of contact with the contaminant to which it can readily bond with and precipitate the PFC compounds. This approach affords the opportunity to flexibly adjust the quantity and application method of the additive to changing conditions within the untreated water. This permits optimisation of the process to target concentration levels and therefore optimise cost.

Typically, a relatively small activated carbon step is included as a buffer/polishing step downstream of the mixing reactor vessel. However, the life expectancy of the carbon will be considerable.

Mobile small-filter installation for treating PFC contaminated groundwater and waste water from fire extinguishing applications

Mobile container installation for treating PFC contaminated water with the PerfluorAd process

Economically viable treatment of PFC contaminated water.

Cornelsen Umwelttechnologie GmbH designs, builds and operates systems for the treatment of water contaminated with PFCs. These systems are mobile and are typically located on the customer premises. This is particularly applicable for PFC contaminated water from landfill seepage, waste water from fire extinguishing activities, groundwater etc.

The Cornelsen PerflourAd treatment process can be combined with existing treatment systems to optimise performance.

Pre-filter and adsorber columns in the extended column test installation

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