



Aerobic Biotransformation and Defluorination of ether PFAS

Tech ID: 33656 / UC Case 2024-708-0

FULL DESCRIPTION

Background

Fluoroalkylether substances (ether PFAS) are a significant group of per- and polyfluoroalkyl substances (PFAS). Considered as alternatives to legacy PFAS compounds like PFOA and PFOS, ether PFAS are distinguished by the presence of ether bonds (C-O-C) within their chemical structures. GenX and F-53B are two prominent examples of ether PFAS. Although some studies have investigated the environmental occurrence and fate of some emerging ether PFAS, a significant knowledge gap remains regarding a systematic understanding of the biodegradability of various ether PFAS structures.

Technology

Prof. Yujie Men and her team have established a crucial link between the chemical structure of ether PFAS and their susceptibility to biodegradation. The team elucidated the pathways through which ether PFAS are biotransformed in active sludge communities. Key steps include the initial oxidation of the -CH₂- group, the formation of unstable fluoroalcohol intermediates, and the spontaneous defluorination of these intermediates. The team has demonstrated the efficacy of chemical-biological treatment train system for enhancing the defluorination of recalcitrant ether PFAS like GenX.

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OTHER INFORMATION

KEYWORDS

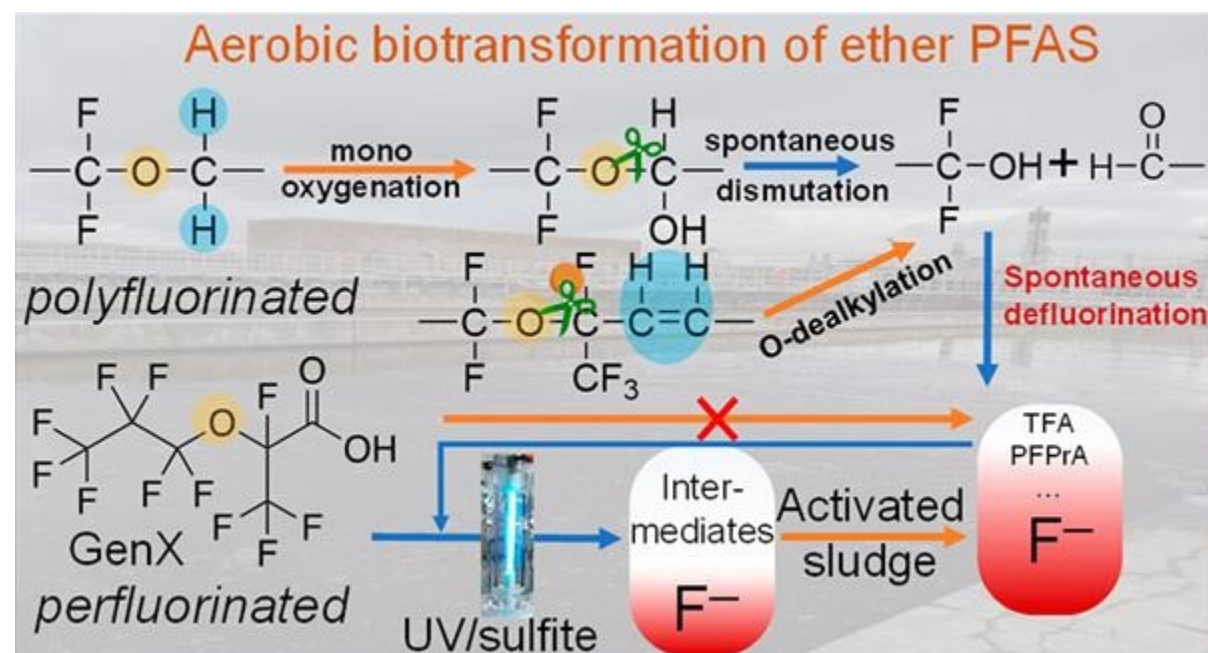
aerobic biotransformation,
 defluorination, ether PFAS, genx,
 PFAS treatment train

CATEGORIZED AS

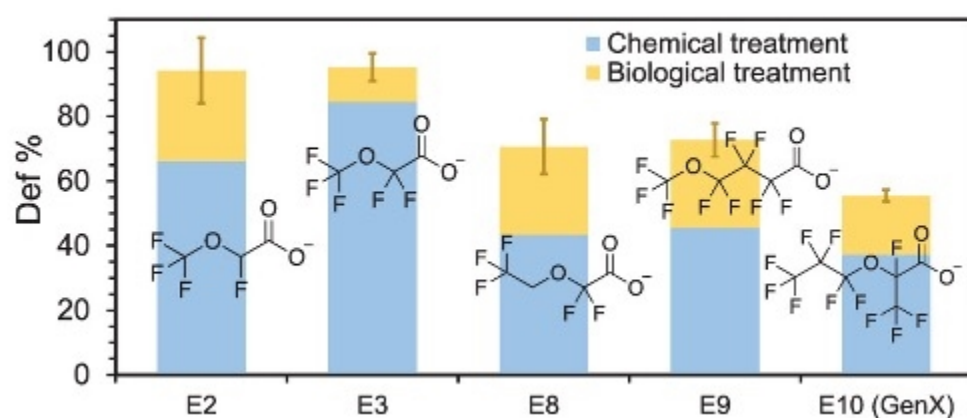
- ▶ **Biotechnology**
 - ▶ Other
- ▶ **Environment**
 - ▶ Remediation
- ▶ **Materials & Chemicals**
 - ▶ Biological

RELATED CASES

2024-708-0



Graphical illustration for the aerobic biotransformation of ether PFAS.



Degree of defluorination of chemical and aerobic biological post-treatments for E2, E3, and E8-E10 (GenX).

ADVANTAGES

Cost-effective - the successful implementation of a chemical-biological treatment train system offers a promising and potentially more cost-effective approach for remediating ether PFAS contamination.

Treatment-train system - combination of advanced reduction treatment with aerobic biotransformation leads to a significant increase in defluorination.

Biotransformation pathways - identification of pathways including the key steps and the formation of unstable fluoroalcohols that lead to significant increase in defluorination.

Alternative PFAS design - provides valuable insights for designing biodegradable PFAS alternatives.

SUGGESTED USES

- ▶ Wastewater treatment
- ▶ Remediation of contaminated sites
- ▶ Design of more biodegradable PFAS

INVENTOR INFORMATION

Please review all the [inventions by Prof. Men and her team](#) at UCR.

Please visit [Prof. Men's group website](#) to learn more about their research.

RELATED MATERIALS

- ▶ [Aerobic biotransformation and defluorination of fluoroalkylether substances \(ether PFAS\): substrate specificity, pathways and applications](#)

PATENT STATUS

Patent Pending

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