
Complete Defluorination of Perfluorinated Compounds by Hydrated Electrons Generated from 3-Indole-acetic-acid in Organomodified Montmorillonite

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Abstract

Here we describe a unique process that achieves complete defluorination and decomposition of perfluorinated compounds (PFCs) which comprise one of the most recalcitrant and widely distributed classes of toxic pollutant chemicals found in natural environments. Photogenerated hydrated electrons derived from 3-indole-acetic-acid within an organomodified clay induce the reductive defluorination of co-sorbed PFCs. The process proceeds to completion within a few hours under mild reaction conditions. The organomontmorillonite clay promotes the formation of highly reactive hydrated electrons by stabilizing indole radical cations formed upon photolysis, and prevents their deactivation by reaction with protons or oxygen. In the constrained interlayer regions of the clay, hydrated electrons and co-sorbed PFCs are brought in close proximity thereby increasing the probability of reaction. This novel green chemistry provides the basis for *in situ* and *ex situ* technologies to treat one of the most troublesome, recalcitrant and ubiquitous classes of environmental contaminants, i.e., PFCs, utilizing innocuous reagents, naturally occurring materials and mild reaction conditions.

Keywords: Hydrated electrons, perfluorinated compounds, organo, montmorillonite, photodefluorination

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