Environmental Impact and Removal Strategies of Organic UV Filters: Challenges and Advanced Oxidation Solutions

Organic UV filters are used in personal care products, plastics, paints, and textiles to protect against UV radiation. Despite regulatory limits, these compounds still enter the environment through direct wash-off during swimming, leaching from products, and incomplete removal in wastewater treatment plants. They have been detected in various water bodies, sediments, and sludges worldwide. Once in the environment, organic UV filters can undergo phototransformation and biotransformation, forming transformation products that, together with parent substances, pose health risks to humans and wildlife and harm marine ecosystems, especially coral reefs. Given water scarcity and their environmental impact, removing these filters from aquatic environments is crucial. Advanced oxidation processes (AOPs) show promise in addressing these contaminants. This talk will examine the distribution, transformation, and impacts of organic UV filters and the potential of AOPs for their mitigation.

In situ Treatment of Hazardous Chemicals

In situ chemical oxidation (ISCO) using peroxydisulfate is increasingly preferred for remediating soils and shallow groundwater contaminated with organic compounds. Researchers have extensively examined the chemistry of peroxydisulfate and the oxidative species generated during its decomposition (i.e., sulfate radicals and hydroxyl radicals) over the past five decades, providing detailed information on reaction kinetics, mechanisms, and product formation. However, to optimize the application of peroxydisulfate for contaminated sites remediation, it is crucial to consider conditions such as high oxidant concentrations and the presence of minerals and solutes that impact radical chain reactions. This talk aims to offer insights into the chemistry of peroxydisulfate-based ISCO to enhance system efficiency and pinpoint areas where further research is needed to better understand system performance.