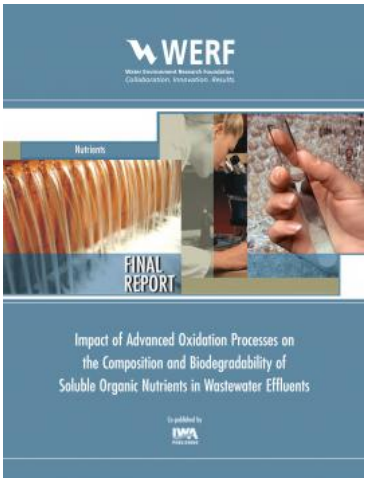
Impact of Advanced Oxidation Processes on the Composition and Biodegradability of Soluble Organic Nutrients in Wastewater Effluents

Editor(s): April Z. Gu



The characteristics and bioavailability of wastewater derived “refractory” organic nutrients and their susceptibility to removal has drawn significant attention from both regulatory agencies and wastewater utilities. As suggested by recent studies, the bioavailability of effluent organic nutrients to algae is relatively high. This implies that discharge of effluent organic nutrients from water resource recovery facilities (WRRFs) may contribute to the eutrophication potential. Therefore, investigation into alternative technologies for organic nutrients transformation and reduction, and the mechanisms involved in those processes, is warranted with the ultimate goal of improved eutrophication control.

Advanced oxidation processes (AOPs) have been shown to be capable of reducing the concentrations of soluble organic nutrients and converting specific nutrient-containing organic compounds into simpler or more biodegradable forms. The overall objective of this study was to investigate the impact of AOP treatments on the speciation and composition of soluble nutrients and consequently their biodegradability in wastewater effluents. Secondary or tertiary effluents from three selected wastewater treatment plants were collected. Each effluent was treated with three different AOPs, including low-pressure ultraviolet (UV) irradiation, hydrogen peroxide (H2O2), and a combination of UV and H2O2. Both untreated and AOP-treated effluents were subjected to a comprehensive analysis for wastewater characterization, nitrogen speciation analysis, phosphorus speciation analysis, and soluble organic nitrogen (SON) biodegradability assays.

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