[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-GE Geological & Soil Environment

[A-GE30]Energy-Environment-Water Nexus and Sustainable Development

convener:Ming Zhang(Institute for Geo-Resources and Environment, Geological Survey of Japan, AIST), Ken Kawamoto(Graduate School of Science and Engineering, Saitama University), Xue Qiang(中国科学院武漢岩土力学研究所, 共同), Jet-Chau Wen(National Yunlin University)
Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
This session provides a broad platform for discussion and presentation of fundamental and up-to-date scientific results related to clean energy production, environmental remediation and restoration, waste management, water cycle, monitoring of water quality, management of water resources and interconnections among them for sustainable development. Presentations on the topics associated with social science that enhance public awareness, stakeholder empowerment and involvement, and policy decisions regarding the management of water, energy and the environment are also encouraged.

[AGE30-P04]Minimizing the interference of carbonate ions on degradation of SRF3B dye by Fe^0-aggregate-activated persulfate process

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Keywords:Carbonate ions, Dye, Persulfate, Ultrasound, Zero-valent iron aggregates

Carbonate ions in wastewater can interfere with the reactions in advanced oxidation processes. In the present study, the effects of carbonate ions on the degradation of a polyazo direct dye, the Sirius® Red F3B (SRF3B), using persulfate (PS) oxidation catalyzed by Fe^0 aggregates (PS/Fe^0) was investigated. Results of this study indicated that the oxidation power of the PS/Fe^0 process was inhibited in the dye solutions containing carbonates, and the efficiency of SRF3B decolorization decreased with increasing concentration of Na_2CO_3. A short period of ultrasound (US) irradiation can significantly enhance the destruction of dye molecules. Complete decolorization of a 25 mg/L SRF3B solution containing 1×10^{-3} M carbonate, 5×10^{-3} M PS, and 1.5 g/L Fe^0 was achieved within 5 min in a PS/Fe^0/US system augmented with 5 min of US irradiation (60 kHz, 106 W/cm^2). The operating cost to complete removal of the dye was estimated at 2.79 USD/m^3. Higher PS dosage and US power further minimized the interference from carbonate ions. A two-step reaction model, including a slow surface heterogeneous and a fast homogeneous aqueous reactions was proposed for the system. The presence of Fe^{2+} and Fe^{3+} ions identified using X-ray photoelectron spectroscopy, suggests a direct oxidation of the dye on the surface of the Fe^0 aggregates.