
[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(中国科学院武汉岩土力学研究所, 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-P03]Biodegradation of Chlorinated Ethenes

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Keywords:Biodegradation, Chlorinated ethenes, Biodegradation pathway, Degradation rate

Chlorinated ethenes, such as tetrachloroethene (PCE) and trichloroethene (TCE), have been widely used as solvents for dry cleaning and degreasing and many other applications. Extensive use and inadequate disposal of chlorinated ethenes have led to prevalent groundwater contamination worldwide, especially in industrially developed countries, like Japan. The occurrence of the lesser chlorinated ethenes, such as cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC) in groundwater is primarily a consequence of incomplete anaerobic reductive dechlorination of PCE and/or TCE.

VC is more toxic and is known to be a human carcinogen. It has recently been specified as a new substance for regulation by the Soil Contamination Countermeasures Act in Japan.

To obtain the information that facilitates better understanding of the origin and prediction of the fate of VC at contaminated sites, this presentation summarizes the biodegradation mechanisms, potential biodegradation pathways, degrading microorganisms, and biological degradation rates under natural and enhanced conditions based on extensive literature survey. In addition, theoretical solutions for analyzing up to four steps consecutive reactions are derived. The solutions can be used to simulate complete anaerobic biodegradation of PCE to non-toxic ethene (ETH) through TCE, cis-DCE and VC.