Role(s) of didecyl surfactant in reduction of HMXcontaminated soil by Fe0. (S11-park142935-Poster)

Authors:

- J.Park* University of Nebraska-Lincoln
- S.D.Comfort University of Nebraska-Lincoln.
- P.J.Shea University of Nebraska
- T.A.Machacek University of Nebrask-Lincoln

Abstract:

Explosives-contaminated soil and water is a serious problem because of potential hazards to humans and the environment. Zerovalent iron Fe(0) can be used to chemically reduce RDX and HMX in water and soil, however HMX is destroyed more slowly than RDX. Our previous work indicated that adding didecyldimethylammonium bromide, a cationic surfactant, greatly increased HMX destruction by Fe(0) in solution and soil slurries. Our objectives were to evaluate pretreatment of Fe(0) with didecyl surfactant and study the mechanism(s) of surfactant-enhanced HMX destruction. Pretreating Fe(0) with didecyl increased the HMX destruction rate from that observed when didecyl was added with the Fe(0). Scanning electron microscopy revealed the smooth surface of surfactant-treated iron, indicating adsorption and surface modification that may inhibit rusting. Sorption by surfactant admicelles can greatly increase HMX concentration at the reactive iron surface. Didecyl may also facilitate electron transfer for HMX reduction. Our results indicate how the surfactant can be used to facilitate iron-mediated destruction of HMX.

Corresponding Author Information:

Jeong Park University of Nebraska-Lincoln 372 PS East Lincoln, NE 68583 phone: 472-3966 e-mail: jpark304@hotmail.com

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