

## **Effect of natural organic matter on toxicity and reactivity of sulfidated nano zerovalent iron**

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Sulfidated nano zerovalent iron (S-NZVI), a newly developed modified NZVI material, has good applied potential in groundwater remediation because of its high stability, reactivity and selectivity. However, it is inevitably affected by natural organic matter (NOM), which is multi-componential and ubiquitous in subsurface environment. Though the interaction of NZVI with NOM has been studied, there is no systemic research on the effect of NOM on S-NZVI, considering the difference of properties between sulfidated and unsulfidated NZVI.

In our present study, S-NZVI (Fe/S=20) was synthesized by sonicating NZVI and Na<sub>2</sub>S solution. The reactivity and toxicity was evaluated by the degradation of trichloroethylene (TCE) and the survival of *E. coli*, respectively, in the absence and presence of humic acid (HA). The results showed the adsorbed HA on the surface of particles increasing the surface charge, dispersity and thus protected bacteria by electrostatic repulsion and steric effect. And HA showed dual effect on degradation activity. At low concentration of S-NZVI, SRHA promoted TCE removal as a bridge connecting TCE with S-NZVI. While the concentration was high, its inhibitory effect dominated instead by passivating iron particles and limited electrons transfer between TCE and iron. XPS spectra also indicated that S-NZVI will be easier to be oxidized in the presence of HA. The results indicate that the effect of HA would be carefully considered for the real in-situ application of S-NZVI.

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