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Selenite Removal from Groundwater by Zero-valent Iron (ZVI) in Combination with Oxidants

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Abstract We recently demonstrated common oxidants simply coupled with ZVI to continuously drive the accelerated Fe^0 corrosion and hence achieve fast and very efficient removal of heavy metals and metalloids from groundwater. In this study, we aimed first to answer a basic question of the oxidant dosage theoretically required to sequester a certain amount of selenite. The specific ratio of oxidant dosage to Se(IV) removal, which reflected the theoretically minimal oxidant dosage required to sequester one mole of Se(IV), was almost independent of the initial Se(IV) concentration but significantly affected by the difference in oxidant species. To sequester one mole of Se(IV), the minimum dosage of the required oxidant was calculated to be 3.94~4.09 for NaClO, 3.90~4.33 for H_2O_2, and 3.29~3.54 for $KMnO_4$, respectively. Simultaneous aeration increased the removal efficiency of Se(IV) and substantially reduced the required dosage of oxidants. To form a strong contrast with very limited Se(IV) removal by ZVI alone, the coupling of NaClO and