TOPIC: USING FERRATE (VI) AS ELECTRON ACCEPTOR IN OXIDATIVE AND BIO-STIMULATED DEGRADATION PROCESSES

Barium ferrate (BaFeO4) is a ferrate(VI) salt that offers slow-release properties which makes it a promising agent for in-situ groundwater remediation since it could be used to create a depot-effect in the aquifer. Having a redox potential of 2.20 V, ferrate(VI) is one of the strongest oxidants known for water and wastewater treatment, however, under acidic conditions. Since a modification of the aquifer properties to that effect is of limited practical relevance, particularly the use of ferrate(VI) for stimulating the microbial degradation of 4-nitrotoluene (by providing an electron acceptor) has been investigated. Batch tests as well as column tests (under flow-through, and thus more field-similar conditions) have been conducted. Column tests indicated that there was no improvement of microbial 4-nitrotoluene degradation by the addition of barium ferrate. Compared to the column not containing ferrate(VI) a distinct decrease in sulfate concentration of the used water was found. This might also be attributed to the formation of barium sulfate whose precipitation might have led to a surface passivation of the ferrate(VI) particles and consequently to a hindrance of electron transfer.

Keywords: Ferrate(VI), chemical oxidation, bio-stimulation, (nitro)aromatic compounds