

Arsenic Releasing Characteristics During Muddy Sediments Compaction Under Different Conditions

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Introduction and Methods

Muddy sediments contain large amounts of chemical components such as arsenic, which could be released to the environment during muddy sediments transforming into clay. We conducted indoor compaction experiments to reveal main processes controlling As release from muddy sediments under different conditions (natural and phosphate-treated muddy sediments were selected to simulate natural condition and agricultural pollution condition cases, respectively).

Discussion of Results

Aqueous arsenic ranged from 17.5 to 21.3 $\mu\text{g/L}$ and As(III) was the main chemical speciation in pore water during natural muddy sediments compaction(Fig.1). Fe(II) became the primary Fe species and was well correlated with As(III). Results of sequential-extraction experiment showed that Fe-Mn oxides bound arsenic as a major species reduced after compaction. Based on the results, the reductive dissolution of Fe-Mn oxides/hydroxides was the main process controlling As release during natural muddy sediment compaction.

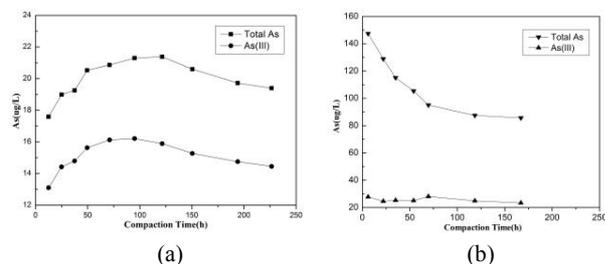


Figure 1: Variation of total As and As(III) concentration in pore water(a: natural muddy sediments; b: phosphate-treated muddy sediments).

Total As ranged from 109.1 to 147.4 $\mu\text{g/L}$ and As(V) was the main chemical speciation during phosphate-treated muddy sediments compaction(Fig.1). Moreover, low Fe(II) concentrations, high NO_3^- , SO_4^{2-} concentrations and positive Eh values were detected in pore water. Those could indicate that cation competitive adsorption was the most important process controlling As release during the compaction.