



“Gheorghe Asachi” Technical University of Iasi, Romania



EFFICIENT REDUCTION OF NITRITE BY STRUCTURAL Fe(II) IN MONTMORILLONITE

Yasir Al-Ani^{1*}, Zainab Malik Ismael², Ahmed Rahomi Rajab³

¹Department of Dams & Water Resources Engineering, Faculty of Engineering University of Anbar, 31001 Ramadi, Anbar province, Iraq

²Department of Civil Engineering, Al-Maaref University College, 31001 Ramadi, Anbar province, Iraq

³Department of Civil Engineering, Faculty of Engineering University of Anbar, 31001 Ramadi, Anbar province, Iraq

Abstract

A reduction operation by iron-borne clay mineral has been introduced as a worthy mechanism to mitigate nitrite (NO_2^-) concentrations in anoxic zones. Reduction/oxidation reactions in subsurfaces often transform from anoxic circumstances to oxic conditions due to the actions of nature and man-made performance. The study elucidates that NO_2^- can be effectively oxidized by oxygenated and reduced montmorillonite (SWy-2) under neutral pH conditions. The reduction of nitrite was achieved after the first 30 minutes of the reaction, and the amount of Fe(II) consumed for the nitrite reduction decreased with time of reaction, while the byproducts of the reaction increased with the alteration of nitrite over time. According to our estimates, the amount of Fe(III) that was reduced by almost 70% was stated as a percentage of the production of pure Fe(II). From a sustainability perspective, oxidation of NO_2^- is applicable when the oxidized iron-borne clay mineral is reduced by chemicals. This recently developed concept may be considered eligible for other reduction/oxidation reactions that effectively reduce active pollutants.

Keywords: clay minerals, montmorillonite, nitrite mitigation, redox

Received: August, 2022; Revised final: January, 2023; Accepted: January, 2023; Published in final edited form: February, 2023

* Author to whom all correspondence should be addressed: e-mail: aniyaser@uoanbar.edu.iq; aniyaser@yahoo.com; Phone: +964 7830821878