

Removal of phosphorus by Fe leaching solution from various Fe containing minerals

Jueun Jung, Sungjun Bae*

*Department of Civil and Environmental Engineering, Konkuk University, 120
Nuengdong-ro, Gwangjin-gu, Seoul 05029, Republic of Korea*

* bsj1003@konkuk.ac.kr

ABSTRACT

Various biological, chemical and physical technologies have been studied to effectively remove the total phosphorus (T-P) in wastewater treatment processes. Among them, some mineral suspension and cation in the aqueous phase have shown a great potential to promote phosphorus precipitation via reaction of chemical precipitation. First, we investigated the removal efficiency of T-P by various cations (e.g., Fe(II), Fe(III), Mg(II), and Al(III)) and found out that Fe(III) showed the highest removal efficiency (33.1%) regardless of the type of count anion (Cl⁻, NO₃⁻, and SO₄²⁻). Therefore, three different Fe(III)-rich minerals (i.e., hematite (Fe₂O₃), lepidocrocite (γ-FeOOH), and magnetite (Fe₃O₄)) were used as Fe(III) sources and treated in various HCl concentration to maximize the dissolved Fe(III), resulting in the most effective Fe(III) leaching in the sample of lepidocrocite with 2N HCl. Interestingly, almost no significant difference in Fe(III) leaching was observed between HCl and H₂SO₄, while lepidocrocite - 2N H₂SO₄ showed the highest T-P removal (91.5%) at suspension pH of 6.53. The results can provide fundamental knowledge about the effect of cations on the T-P removal in wastewater treatment and the feasibility of the Fe(III) leaching method by Fe containing minerals for efficient T-P removal via chemical precipitation.

Acknowledgments

This research was supported by the Korea Environment Industry & Technology Institute (KEITI) through "Subsurface Environmental Management (SEM) Project", funded by Korea Ministry of Environment (MOE) (2020002480006)