TREATABILITY TEST OF ARSENIC-CONTAMINATED PADDY SOILS BY AN ACIDIC SOLUTION

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Abstract- This study performed lab-scale washing of a paddy soil contaminated with arsenic using $FeCl_3$ solutions. The test soil was obtained in a paddy field near a closed mining area. This study monitored the variation of the As concentrations of soil after treatment with different concentrations of $FeCl_3$ washing solutions.

Index Terms- Paddy soil, Arsenic, Washing, Mining area

Contamination by As and heavy metals is problematic in the geochemical environment around metal mining areas due to arsenic-related chemical spills in agricultural and industrial areas[1]. Arsenic and heavy metals have been also contaminants in metallic ores and industrial effluents in Korea [2-3]. Soil washing of As has been treated with sodium hydroxide extraction in an alkaline environment [4] and acid washing [5]. In this study, the lab-scale washing of paddy soil contaminated with As was performed as a recalcitrant case. The objectives of this study are to find the optimal conditions of $FeCl_3$ -washing for the removal of As and to evaluate the characteristics of soil contaminants using sequential extraction method

The particle size analysis of the contaminated soil consisted of sand (19.5 %), silt (40.5%), and clay (40.0 %), which represented the textural classification of silt clay (Figure 1). The total concentration of As was found to be 29.3 mg/kg and existed mainly in the residual fraction (Figure 2). As was secondly enriched in Fe/Mn (hydro)oxides fraction.

$FeCl_3$ washing of the contaminated soil extracted As with a decrease of 10~40% in their concentrations, which shows that the efficiency of chemical extraction of As is determined by the residual fraction of As in the contaminated soil.

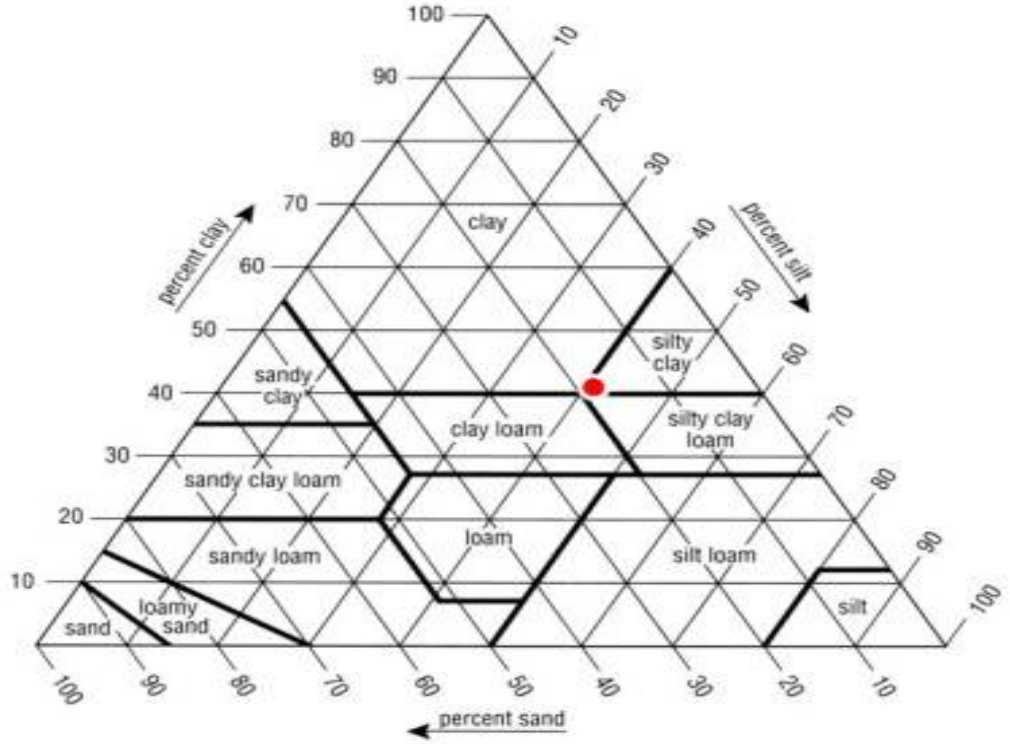


Fig. 1. Textural classification of test soil

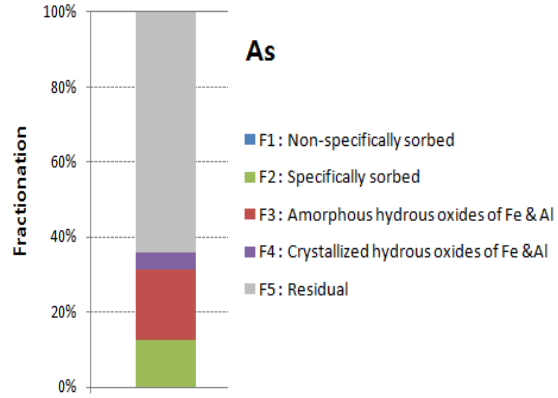


Fig. 2. Chemical fraction of As of the contaminated soil

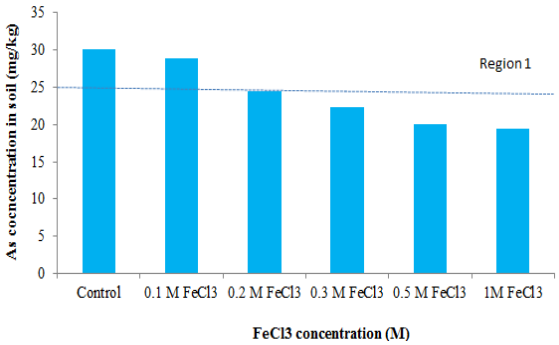


Fig. 3. Concentration of As after $FeCl_3$ washing at different concentrations of $FeCl_3$

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