Effect of soil properties on fluorine desorption behavior in soil using various leaching tests

JUNSEOK LEE[1], DOYOUNG KIM[12], EUNHYE KWON[12], HYUN A LEE[1], SANGHOON LEE[2] AND HYE-ON YOON[1*]

[1]Seoul Center, Korea Basic Science Institute, 6-7, Inchon-ro 22-gil, Seongbuk-gu, Seoul 136-075, Repubilc of Korea
[2]Environmental Engineering Section, Division of Biotechnology, Catholic University, 43, Jibong-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Republic of Korea
(*correspondence: dunee@kbsi.re.kr)

In this study, we demonstrated fluorine (F) desorption behavior in soil using various leaching tests including continuous batch, column, and pH stat tests. All 16 surface soil samples (0 – 30 cm) were collected from the intersecting point of each grid reference within a radius of 1 km of the point where the HF leakage accident took place. Physicochemical properties (i.e., pH, CEC, T-P, OM, andsoil texture) of soil samples were determined in order to understand the relationship with F desorption behavior using correlation analysis.

The experimental results of batch tests showed that the rate of F release from to first was relatively higher than that of those released after first. This higher rate of F desorption in the first stages demonstrated that water soluble F is extracted at the beginning of extraction tests. The concentrations of F were poorly fitted by different kinetic equations and the coefficient of determination (R^2) were compared to determine suitable equation to F desoprtion kinetics. In pH stat test, F concentration extracted from soil increased with a increase in pH. This result indicated that by raising the pH, more OH^- ions compete with F^- for sorption sites and consequently cause more F desorption amounts from the soil. The F concentrations extracted from soil had significant correlation with CEC. These results indicated that pH and CEC are the most important soil characteristics affecting F desorption behavior.

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