Geochemical controls on dispersion and migration of fluoride in soil and soil solution via accidental leakage

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Recently, anhydrous hydrofluoric acid was leaked in Kumi, Korea where the adjacent area was subject to contamination. This study concerned not only with the short-term influence of the spillage but also with the long-term impact on the area. Both soil and soil porewater chemistry were analysed. Soil solution chemistry is expected to provide information for real time migration of elements in soil, whereas soil chemistry is more static and long-term perspective. Two stages of soil samplings taken: the first, several days after the spillage and the second one year later. No dramatic differences exist between the samples and therefore the spilled F seem to have degraded and dispersed quite rapidly, even in very early stage of the accident. The soil in the area do not show evidence of contamination, reporting less than background levels, reported in other studies. F concentrations in the soil and soil solution did not represent good correlation either. Water soluble F and porewater F are in good correlation and both solutions are controlled by pH to some degree. The higher the pH, the higher in the soill solutions and this is thought to be competion between the adsorbed F and hydrogen ions F concentraions in soil seem to have been more influenced by land use, rather the geochmical factors such as pH. A spiked sample was leached by succesive batch methods and continuous column methods. High amount of F was leached in the early stage of leaching and then the concentrations decreased rapidly with number of leachings and increasing pore volums. In conclusion, little evidence are suggested for extensive dispersion of F. F is mobile and easily soluble and eveidently seem to have been controlled by CaF_2 by geochemical modelling, which limits the F concentrations in soil porewater.

This study received support from the Geo-Advanced Innovative Action (GAIA) project of the Korea Environmental Industry & Technology Institute (KEITI).