Geophysical Research Abstracts
Vol. 15, EGU2013-1983, 2013
EGU General Assembly 2013

Release of iron-cyanide complexes form contaminated soils - Batch and column experiments on substrates from Manufactured Gas Plant (MGP) site

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Soils of former Manufactured Gas Plants (MGPs) are often contaminated with iron-cyanide (Fe-CN) complexes that originate from gas purification process. Cyanide is a potentially toxic substance and its presence in soil and groundwater may cause risk for human health as well as for the environment. MGPs were commonly built on the city suburban areas, which have spread ever since. Nowadays, these sites are typically located in inner cities, causing environmental thread, due to the leaching of pollutants. More recently, columns and batch experiments have been used to study fate and mobility of contaminants is soil. The release of iron-cyanide complexes under unsaturated flow conditions was evaluated with eight columns of 30 cm length and a diameter of 5,4 cm. Cyanide concentrations in the collected leachates were measured with Flow Injection Analysis (FIA). Additionally pH, electrical conductivity (EC) and various ion concentrations were determined. In order to compare the release of Fe-CN complexes in saturated conditions a batch experiment was conducted, where in defined time intervals, 1 ml of the extract water phase was analyzed for CN concentration. Study revealed an analogous trend of cyanide release in both experiments indicating primarily the release of formerly dissolved phase (hexacyanoferrates) followed by continual dissolution of ferric ferrocyanide. We conclude that batch experiments, conducted prior to column analysis, can serve as preliminary prediction of the water soluble cyanide fraction under unsaturated conditions.