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Transformation of inorganic As species in groundwater samples with the presence of Fe(II)/Fe(III)

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The distribution of inorganic arsenic (As) species in groundwater sample, including As(III) and As(V), must be preserved to reduce the conversion caused by Fe oxyhydroxides precipitation. Ten groundwater samples with varied As and Fe concentrations were collected from two catchments in Taiwan. After filtration of samples in field, inorganic As species were immediately preserved by adding EDTA/acetate acid. According to the analytical results, arsenite is the dominant species of inorganic As in most of samples. However, the distribution of Fe2+ are widely varied and inconsistent with the equilibrium calculation by geochemical program, PHREEQC, which the Fe(II) should be the primary Fe species under reducing condition. The positive saturated index (SI) of Fe oxyhydroxides indicated that the Fe precipitation may occur. Indeed, the oxidation of Fe2+ rapidly forms Fe oxyhydroxides in non-preserved samples, causing the adsorption and/or co-precipitation of inorganic As and the decrease of aqueous As concentrations. EDTA/acetate acid can effectively low the rate of As(III) oxidation and eliminated the precipitation of Fe and As, especially in high-Fe groundwater samples. However, for low-Fe groundwater, other preservative methods should be considered, such as the phosphoric acid and hydrochloric acid.