Humic acid-enhanced ultrafiltration for removal of heavy metals

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We tried the removal of heavy metals in aqueous solution using ultrafilteration. Humic acid was used as complexing agent. The removal rate in case of low metal concentration (at ppb order) was examined. Simultaneously, dependency on reaction time was checked. A solution with cupper ion concentration of 100ppb and with humic acid concentration of 100 mg/l was prepared. pH was adjusted at 4, 6 and 8, using HCl and NaOH. Prior to ultrafiltration, solutions are shaked at 25 degrees with 200rpm for 0, 3, 6 and 12 hours. Ultrafilteration experiments were carried out with MWCO of 10,000, with 2000rpm, 10min. The cupper ion concentration of permeate was measured with ICP-MS. At pH 4, the removal efficiency was increased in proportion to the shaking time. After 12 hours shaking, about 80% of cupper was removed. In contrast, at pH 6 and 8, about 80% of cupper was removed over 3 hours shaking. Therefore, at high pH and with enough quantity of humic acid, about 80% of cupper at ppb order can be removed in a brief time. Now we are performing using various kinds of heavy metals to estimate the applicability of the ultrafiltration.