Ecological technology and management
Kalmar, Sweden, September 22-24, 1999

29

A NEW SORBENT FOR DIVALENT MERCURY AND LEAD IN AQUEOUS SOLUTIONS

Håkan Gustafsson
Håkan Anderberg, Akram Ismailan, Linda Aronsson,
University of Kalmar, Sweden
Erik Bigée,
HS Jordhälsan,Kalmar, Sweden
Leif Grehn ,
University of Uppsala , Sweden

SUMMARY. A new polymer containing amide and thioamide groups has been synthesized. The polymer has a high capacity to bind divalent mercury. One gram of the polymer binds 5.3 mmoles or 1.1 g Hg^{2+}. It also binds Pb^{2+} but to a lesser extent, 1.7 mmoles or 0.35 g Pb^{2+}/g polymer.

A fine-grained polymer has been synthesized in a one-pot syn-thesis at room temperature. The polymer contains amide and thioamide groups.The polymer is stable under acidic and neutral conditions, insoluble in water, mineral acids and most common organic solvents, soluble in *N,N*-dimethylformamide (DMF), sulfoxide (DMSO) and aqueous sodium hydroxide, but sparingly soluble in chloroform.

The polymer has a very high capacity to bind Hg^{2+}. Atomic ab-sorption spectrophotometric (AAS) measurements show that the adsorption capacity (Q_0) is 5.3 mmoles or 1.1g Hg^{2+} /g polymer which is consistent with the calculated value obtained when assuming two-site adsorption. The time needed to achieve 50% of the loading capacity of the polymer is 30 minutes. The polymer also binds Pb^{2+} but to a lesser extent, 1.7 mmoles/ g polymer or 0.35 g Pb^{2+} /g polymer. The polymer, having sulfur and nitrogen as coordinating atoms, is expected to also have high affinity to other soft acids, e.g. Ag^{+} and Au^{3+} ions.

The polymer was characterized by elemental analysis, FT-IR, ^{1}H- and ^{13}C-NMR spectroscopy. The polymer shows several ^{13}C-NMR signals in the thiocarbonyl region possibly indicating a partially branched structure.

Synthesis optimization and further characterization of the polymer including its metal ion binding ability also of other metals are currently in progress.