



Temperature and pH influence on the efficiency of trace metals leaching from sewage sludge with EDTA solution

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ABSTRACT

Sewage sludge cumulates harmful, non-biodegradable trace metals. For this reason further management could be problematic. Extraction of metals with EDTA is one of the way to decrease of their content in sewage sludge. The aim of the presented studies was an evaluation of impact of pH and temperature changes on the efficiency of selected metals (Zn, Cu, Ni, Cd and Pb) elution from sewage sludge with EDTA solution. Efficiency of EDTA was estimated after shaking of a sludge sample with 0.1 M aqueous solution. Initially with solutions adjusted to pH in the range 3.0 to 12.0 at 20°C, in the second step at different temperatures in the range 20°C–70°C at pH equal to 4.5. EDTA solution was an effective extractant for the heavy metals removal from sewage sludge. The best extracted metal was zinc and the lowest efficiency was observed for copper. Extraction of metals decreased when pH of washing solution increased. For the analyzed extraction processes, optimal pH was in the range 3.0–6.0 (efficiencies of metals removal were in the range: 30%–32%, about 2%, 26%–27%, 34%–44% and 37%–39% of total amount for Zn, Cu, Ni, Cd and Pb, respectively). For experiments at different temperatures, the amount of removed metal raised with temperature increase. The lowest amount of metal was extracted at 20°C (31%, 2%, 26%, 40% and 38% for Zn, Cu, Ni, Cd and Pb, respectively) and the highest efficiency was detected at temperature 70°C (76%, 11%, 38%, 79% and 62% for Zn, Cu, Ni, Cd and Pb, respectively).

Keywords: Heavy metals; Sewage sludge; EDTA extraction
