

Determination of Cr, Pb and Ni in water, sludge and plants from settling ponds of a sewage treatment works

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Abstract

Wastewater from a sewage treatment works is channelled through a series of inter-connected settling ponds into a stream. Furthermore, leachates from a domestic and industrial landfill site are disposed into the first pond. From the variety of plants growing in the ponds, *A. sessilis*, *P. stratiotes*, *R. steudelii* and *T. capensis* were investigated for their ability to uptake chromium, lead and nickel (these metals are toxic to humans while nickel is also involved in plant growth). The levels of the metals in the water, plants and sludge were determined using an inductively coupled plasma-mass spectrometer (ICP-MS). For the plants, the amounts of the metals in roots, stems and leaves were also measured. In general it was found that the plants accumulated up to 15% of the level of metals in the water and that accumulation depends on the plant species as well as on the organ of the plant. The concentrations of metals in the water in the last pond were found to be well within the limits set by the South African National Water Act of 1998 for discharge of water into rivers. Furthermore, the results of this study, which involved a real system, were compared with those from model studies where conditions of the system could be controlled by the investigator.

Keywords: uptake, heavy metals, plants, wastewater treatment