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TOTAL AND DISSOLVED METALS OCCURRENCE IN MUNICIPAL WASTEWATER TREATMENT PLANT EFFLUENTS

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Abstract

Concentrations of seven heavy metals (Cd, Cr, Cu, Fe, Ni, Pb and Zn) in the discharged effluents of four wastewater treatment plants located on the Romanian Black Seacoast, evaluated as average values for four seasons, during 2010-2011 are presented. Total and dissolved metals occurrence was investigated from seasonal samples, to assess the bioavailability of the heavy metals in the discharged effluents. The analytical measurements were performed by flame atomic absorption spectrometry (FAAS) for Fe and Zn, and by graphite furnace atomic absorption spectrometry (GFAAS) for Cd, Cr, Cu, Ni and Pb, after appropriate sample preparation. The obtained results show that the sum of total metals concentration in discharged effluents in the Black Sea was below 2000 µg/L, for all investigated samples. Differences in metal concentrations in the effluent were site-specific and varied with seasons, the maximum total metal concentrations being registered in autumn (900 – 1200 µg/L). Some of the metals were occurring mostly in the dissolved forms, like Cd, Ni, and sometimes Cu or Fe. Due to the living organisms' capacity to absorb or assimilate dissolved heavy metals, they became more toxic to the flora and fauna present in the emissary. Even if the concentrations of the individual or total heavy metals determined in the effluents from the studied wastewater treatment plants were not exceeding the accepted values, they are exhibiting toxicity to the marine environment that underlines the need of responsible decisions regarding pollution prevention and new technologies use, to ensure heavy metals removal from municipal wastewater.

Key words: bioavailability, effluent, heavy metal concentration, municipal wastewater

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