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Journal of Geochemical Exploration

Volume 74, Issues 1–3, December 2001, Pages 153-162

Uptake of heavy metals, arsenic, and antimony by aquatic plants in the vicinity of ore mining and processing industries

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[https://doi.org/10.1016/S0375-6742\(01\)00181-9](https://doi.org/10.1016/S0375-6742(01)00181-9)

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Abstract

The uptake of heavy metals, As, and Sb by aquatic plants – fluvial horsetail, platyphyllous cattail, etc. – growing in industrial collection ponds of metal mining industry in the Kemerovo region, Russia, was studied. Cu, Pb, Cd, Zn, As, and Sb are the major pollutants in these plant habitats. The elemental concentrations in plants, their acid extracts, and the bulk water chemistry were determined by flame and electrothermal atomic absorption spectrophotometry. Sediments were analyzed by X-ray fluorescence. The analytical data obtained demonstrate high pollutant concentrations in sediments, water, and plants, especially in their roots. Submerged hornwort and pond scum were shown to be hyperaccumulators. The heavy metal concentrations in the plants exceed the corresponding concentrations in the habitat (water) by tens of thousand times. Analysis of fresh platyphyllous cattail acid extracts has demonstrated that As and Sb

present a serious threat to human and animal health, as they are capable of entering food chains in large amounts.



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Keywords

heavy metals; arsenic; antimony; sediment; water; aquatic plants; foodwebs

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