

Behavior of Hg speciation in the technogenic soil-plant system with extreme elemental contents

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The Ursk tailings, formed 80 years ago, is composed of the sulphur-pyrite polymetallic primary ores and weathering profile ores of the Novo-Ursk deposit stored in two separate dump sites of 10-12-m height (Kemerovo region, Russia). Wastes of Ursk tailings contain high contents of Hg (for primary ore – above 100 µg/g, for weathering profile ores – 20-30 µg/g), that provided her elevated local background. The quarry has been flooded. Wastes have not been reclaimed, and so far it has been exposed to rain, snowmelt waters and wind erosion. As a result the dumps are eroded and their material shed to a natural swampy ravine that accommodate wastes shed from the piles and to AMD effects. The dispersion train occupies a swampy area with remnants of degraded sedge and bulrush (peat mounds) and tree stumps.

We collected dominant species of riverine plants (woodland bulrush (*Spirpus sylvaticus* S.) and sea bulrush (*Spirpus maritimus* L.)) and soils near by quarry and in dispersion train. Thermal release analysis in combination with atomic absorption detection was applied for determination of mercury species in system “plants-soil”. The method allows to determine HgX₂, (were X – Cl⁻, SO₄²⁻), Hg_{org} and HgS+HgSe, as a sum.

Hg average contents in plants from quarry is significantly less (0.59 µg/g – herbs and 5.2 µg/g – roots 37.2 µg/g – soils) than in sampels of dispersion train (2.8 µg/g – herbs and 25.7 µg/g – roots, 16.8 µg/g – soils). The content of Hg in plants selected in quarry is at 5 times lower than in sampels from the dispersion train, whereas the values for soils is contrary (3 times excess is in quarry samples). Hg_{org} was determinated only in herbs, whereas all identified speciation was estimated in roots and soils. These from dispersion train contain mercury mainly as Hg_{org}. HgX₂ and HgS+HgSe are dominant speciation of mercury in soil and roots near quarry. It is assumed that main factor of mercury accumulation in plants is its affordable speciation rather than quantity in soils.

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