



## Mercury in dumped blast furnace sludge

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### Abstract

Blast furnace sludge (BFS) is a waste generated in the production of pig iron and was dumped in sedimentation ponds. As these wastes often contain high contents of zinc, lead, cadmium, and arsenic, significant hazards to environmental surroundings may arise from former BFS sedimentation ponds. Sixty-five samples from seven BFS locations in Europe were investigated regarding the toxic element mercury (Hg) for the first time. The charge material of the blast furnace operations (coke, iron ores, and additives such as olivine, bauxite, ilmenite and gravels) revealed Hg contents from 0.015 to 0.093 mg kg<sup>-1</sup>. In comparison, the Hg content of BFS varied between 0.006 and 20.8 mg kg<sup>-1</sup> with a median of 1.63 mg kg<sup>-1</sup>, which indicates enrichment with Hg. For one site with a larger sample set (n = 31), Hg showed a stronger correlation with the total non-calcareous carbon (C) including coke and graphite (r = 0.695; n = 31; p < 0.001). It can be assumed that these C-rich compounds are hosting phases for Hg. The solubility of Hg was rather low and did not exceed 0.43% of total Hg. The correlation between the total Hg concentration and total amount of NH<sub>4</sub>NO<sub>3</sub>-soluble Hg was relatively poor (r = 0.496; n = 27; p = 0.008) indicating varying hazard potentials of the different BFS. Consequently, BFS is a mercury-containing waste and dumped BFS should be regarded as potentially mercury-contaminated sites.