Geophysical Research Abstracts Vol. 21, EGU2019-17405, 2019 EGU General Assembly 2019 © Author(s) 2019. CC Attribution 4.0 license.



Emerging contaminants and critical elements in slags from Namibian smelting sites

Vojtech Ettler (1), Martin Mihaljevic (1), Alice Jarosikova (1), Bohdan Kribek (2), Ales Vanek (3), Ben Mapani (4), and Fred Kamona (4)

(1) Charles University, Faculty of Science, Institute of Geochemistry, Mineralogy and Mineral Resources, Prague 2, Czech Republic (ettler@natur.cuni.cz), (2) Czech Geological Survey, Geologická 6, 152 00 Prague 5, Czech Republic, (3) Department of Soil Science and Soil Protection, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6, Czech Republic, (4) Department of Geology, Faculty of Science, University of Namibia, Private Bag 13301, Windhoek, Namibia

Old smelting of non-ferrous metallic ores left huge amounts of waste materials, which may be considered as sources of pollution and critical metals. In this study we focus on slag samples from two smelting sites located in northern Namibia: Tsumeb (Cu-Pb smelting) and Berg Aukas (Pb-Zn-V smelting). Concentrations of major contaminants were extremely high (up to 1.1 wt% As, 2.4 wt% Cu, 10.6 wt% Pb, 23.9 wt% Zn), but the emerging contaminant and critical elements were also found in substantial amounts (up to 172 ppm Ga, 365 ppm Ge, 6400 ppm Sb, 9980 ppm V). The mineralogical investigation using XRD, SEM/EDS and EPMA indicated that the studied slags were composed of olivine- and melilite-family phases, clinopyroxenes, metal(loid)-rich glass and sulphide/metallic inclusions. The leaching experiments confirmed that the majority of metal(loid)s exhibit pH-dependent leaching behaviours with substantial release at low pH. Understanding of specific binding of individual contaminants and critical elements (using a combination of EPMA and LA-ICP-MS) and potential of recovery of valuable compounds from these slag materials will be discussed. This study was supported by the Czech Science Foundation project (GAČR 19-18513S).