

Bioweathering of crystalline and amorphous Cu-metallurgical slags

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Bacterial ubiquity and their interactions in the environment are acknowledged to be scarcely preventable weathering factors at landfill sites [1] [2]. This study addresses a long-term impact of heterotrophic bacteria *Pseudomonas aeruginosa* on the alteration and resulting mobilization of metals from Cu-metallurgical slags. Crystalline massive slag (CS) composed of fayalite, silicate glass and sulfides (*e.g.* bornite) as well as amorphous granulated slag (GS) comprising glass and copper droplets were examined under exposure to following solutions: ultrapure water, growth medium and growth medium cultured with bacteria.

The results revealed that bacterial activity considerably enhances release of metals (*e.g.* Fe up to 99.3%) compared to amounts leached out under sterile conditions. Moreover, bacterial biomass and/or associated metabolites assisted as sorbents for Zn, Pb and Cu.

According to scanning electron microscope observations both slags were found to be weathered yet under abiotic conditions. Glass corrosion and Cu-droplets removal were observed in case of GS, whereas partial dissolution of sulfides and glass were demonstrated for CS. Noticeably greater degree of weathering features resulted from slags exposure to biotic conditions. Moreover, fayalite alteration was solely observed on CS slag exposed to bacterial actions.

It is concluded that bio-weathering process affects slags stability and should not be ignored when slags disposed.

[1] Yin et al. (2014) *Int. Biodeterior. Biodegrad.* **86**, 372-381.,

[2] van Hullebusch et al. (2015) *J. Environ. Manage.* **147** (1), 297-305