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Korotenko, Ekaterina
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Zinc Recovery Potential of MSWI Fly Ash Acid Extraction

Student: Ing. Mgr. Ekaterina Korotenko
Supervisor: doc. Ing. Michael Pohořelý, Ph. D.
Supervising Expert: Ing. Michal Šyc, Ph. D.

Changing legislation in the field of waste management is shifting waste management strategies towards waste-to-energy, recovery, and recycling. Municipal solid waste incinerators (MSWI) treat only in Europe nearly 80 million tons of municipal solid waste yearly and produce approximately 2–3 million tons of fly ash.

Fly ash, one of the solid residues from MSWI, is generally made up of fine solid particles entrained by flue gas from the combustion chamber. It is considered as a secondary source of elements that are relatively easily volatilized, like Zn, Pb, and Cu, and/or salts. For example, acid water from wet scrubbing system can be used for extraction and subsequent recovery of elements from fly ash or for salts recovery. Recovery of materials from fly ash is nowadays still in the development phase.

The aim of the project was to determine the recovery potential of the fly ash acid extraction on the real scale from data obtained from MSWI in the Czech Republic. For this purpose, the composition and properties of solid and liquid streams, including their short- and long-term variability, were examined. Verification of the possibility of Zn recovery from fly ash through acid extraction with flue gas treatment system scrubber liquid has been carried out. The results were compared with the published results of Zn recovery using the Swiss technology FLUWA/FLUREC and the Swedish HALOSEP.¹

The average efficiency of Zn extraction in the real MSWI was close to 60%, which is comparable to the efficiency of the technologies mentioned above. Other benefits of acid extraction are above all the neutralization of two hazardous waste streams from the MSWI (fly ash and scrubber liquid), the reduction of chemicals consumption and the total costs for treatment of fly ash and scrubber liquid, production of stabilized inorganic residues and shifting the process in the waste management hierarchy from landfilling towards metals recovery.

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References

1. Quina, M. J.; Bontempi, E.; Bogush, A.; Schlumberger, S.; Weibel, G.; Braga, R.; Funari, V.; Hyks, J.; Rasmussen, E.; Lederer, J., Technologies for the management of MSW incineration ashes from gas cleaning: New perspectives on recovery of secondary raw materials and circular economy. *Sci. Tot. Environ.* **2018**, *635*, 526–542.