Municipal sewage slude incineration residues as a source of valuable elements or products of environmental concerns

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The increasing production of municipal sewage sludge (MSS) from wastewater treatment brings environmental challanges since it is treated as waste. MSS landfilling is no longer possible due to tightening the EU directives, therefore MSS incineration is regarded as an interesting option for its management and energy recovery (waste-to-energy). As a result of MSS incineration, bottom ash (BA) and air pollution control (APC) residues are produced. Due to volume and mass reduction valuable metals are concentrated in these residues.

In this study we investigated possible ways of management of residues produced in MSS incineration plant in Poland and characterized thier resource potential based on results of chemical analyses (ICP-OES, ICP-MS).

The values of allowable concentrations of metals in the soil at industrial sites at depths 0-2 m with accordance to Polish norms (Dz.U.02.165.1359) were exceeded both in BA (Cr, Sn, Zn, Cu and Ba) and APC (Sn, Zn, Cd, Hg) indicating these materials should not be stored.

The high content of P_2O_5 and K_2O in BA allowed to consider usage of this material as a fertilizer. For solid organic-mineral fertilizers (Dz. U. Nr 147, poz. 1033) standards for Cr and Ni were exceeded, thus disqualifing this material however all standards for solid mineral fertilizers were fulfilled. APC do not meet required criteria for any fertilizer due to too low concentration of P_2O_5 and K_2O and too high concentration of toxic elements.

The relatively high content of valuable elements in both materials can indicate their recovery potential, however after comparing the concentration of valuable metals in residues with minimum concentration in ores currently explioted only Ba and Cr in BA, and Sb concentrations in the APC were elevated. Further analysis will determine the prevalence of metals in residues (metals in the form of inclusions or bound or dispersed in minerals) and will allow estimating whether in a simple and economically reasonable way they can be recovered.

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