

Assessment of physicochemical and biochemical factors of urban street dust

Ocena parametrów fizykochemicznych i biochemicznych odpadu zebranego z mechanicznego czyszczenia ulic

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Street dusts within urban areas represent a repository of multiple contributing sources of pollution including car vehicles emissions (wear of brake pads, tires, catalytic converters and fuel combustion process), chemical compounds used for deicing of streets, products of weathering of construction materials or concrete abrasion and others. Due to the origin of particles, street dusts contain heavy metals and other toxic components. The residue collected during cleaning of streets, called also road sediments, is qualified to municipal wastes, with a code no 20 03 03 (Regulation of the Minister of Environment, September 27, 2001, on waste catalogue). Street dusts consist of a mixture of mineral and organic materials – products of interaction of solid, liquid and gaseous contaminants emitted in the urban environment. Municipal solid waste usually contains high levels of phosphates, sulfates, chlorides, nitrogen compounds, calcium, magnesium, potassium, sodium and heavy metals which limit its management and utilization.

Safe waste management and possible ways of its utilization should be predated by the identification of the chemical composition.

The aim of the present study was to assess content of macro- (C, P, S) and microelements (Zn, Cu, Pb, Ni, Cr, Mn, Fe) and the activity of selected oxydo-reduction enzymes (catalase, arylsulphatase and dehydrogenases) as well as hydrolytic enzymes (alkaline and acid phosphatase) of municipal waste from dry cleaning of streets in order to establish its safe management instead of land filling.

The study showed that the analyzed mounded street dusts consist mainly of mineral particles, with the dominance of sand fraction. The contents of heavy metals (Cu, Pb, Ni, Cr, Mn, Fe) were elevated, and the degree of contamination was different for each metal. In spite of the high contents of phosphorus, analyzed material cannot be used as a soil amendment due to the contamination with metals, particularly copper, lead, nickel and chromium. High contents of sulphates in deposited material could be a threat for the soil environment and limits its utilization. Low value of the Biological Index of Fertility (BIF) indicates that analyzed street dusts have low ability to fulfill nourishing plant needs.