



Innovative methodology for electrical conductivity measurements and metal partition in biosolid pellets

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Use of biosolids to improve the nutrient content in a soil is a common practice. The obligation to restore abandoned mine and the correct application of biosolids is guaranteed by the legislation on waste management, biosolids and soil conservation (Jordán et al. 2008). The present research was conducted to determine electrical conductivity in dry wastes (pellets) using a innovative methodology (Camilla and Jordán, 2009). On the other hand, the present study was designed to examine the distribution of selected heavy metals in biosolid pellets, and also to relate the distribution patterns of these metals. In this context, heavy metal concentrations were studied in biosolid pellets under different pressures. Electrical conductivity measurements were taken in biosolid pellets under pressures on the order of 50 to 150 MPa and with currents of 10-15 A. Measurements of electrical conductivity and heavy metal content for different areas (H1, H2, and H3) were taken. Total content of metals was determined following microwave digestion and analysed by ICP/MS. Triplicate portions were weighed in polycarbonate centrifuge tubes and sequentially extracted. The distribution of chemical forms of Cd, Ni, Cr, and Pb in the biosolids was studied using a sequential extraction procedure that fractionates the metal into soluble-exchangeable, specifically sorbed-carbonate bound, oxidizable, reducible, and residual forms. The residual, reducible, and carbonate-sorbed forms were dominant. Higher Cr and Ni content were detected in pellets made with biosolids from the H3. The highest Cd and Ni values were detected in the H2. The trends of the conductivity curves were similar for the sludge from the isolation surface (H1) and for the mesophilous area (H2). In the case of the thermophilous area (H3), the electrical conductivity showed extremely high values. This behaviour was similar in the case of the Cr and Ni content. However, in the case of Cd and Pb, the highest values were detected in the H2. This experiment could be useful for establishing a general rule for taking measurements of electrical conductivity and heavy metals in biosolid pellets and other types of dry wastes.

References

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