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Environmental Aspects of Coal Ash Utilization**

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**Fly Ash Impact on Soil and Water Contaminations by Minor**

**Elements**

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**Abstract**

Combustion of coal produces fly ash in large quantities as a by-product. Fly ash can be used as a component in cement and bricks, road embankments and as a soil amendment. Most of the utilization options lead to contact between the ash or its leachate and the soil, and this contact may change the environmental conditions of the ash/soil mixture, which in turn, could influence the dissolution and movement of the elements in the soil.

Alkaline fly ash from two sources, Columbia and South Africa, and three Israeli soils were used in this study. The effects of mixing fly ash and soil on the pH, EC, and concentration of macro and microelement were evaluated in a kinetic study. The mobility of the microelements was studied under column experiments with several different packing's.

Leaching availability tests show that the cationic elements like Mn, Ba, Cu and Pb had low leaching availability, while oxi-anions like B, V, Se, Mo and Cr where leaches in large quantities.

Addition of ash to soil increased the pH and the EC in the mixture solution. The microelements were divided into two groups according to their behavior in the ash/soil mixture: 1. Elements whose concentrations in the ash/soil mixture were lower than the sum of their concentrations in the ash and in the soil solution. 2. Elements whose concentrations in the ash/soil mixture were higher than the sum of those in the ash and in the soil solution. The elements B, V, Cr, Mo and Se, which form oxi-anions species in water solution, are included in this group.

The quantities of microelements that leached out of from ash/soil column were higher than those from the soil columns only. When the ash was mixed with soil, the quantities of microelements B, V and Se that leached out from the column were larger than the sum of the quantities leached from the separate ash and soils columns. This increase was due to the relatively low pH of the solution that surrounded the ash particles in the mixture column.

The result of the study indicate that the addition of fly ash to soil changes the soil chemistry, including pH, these changes can increase the dissolution of microelements from the fly ash. It was also found that placing an ash layer upon a layer of soil could decrease the contamination potential of the toxic microelements in the ash.