Characterisation of heavy metals in ashes from a FBC burning coal and industrial residues

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ABSTRACT

One of the main problems of the use of coal and mixtures of coal with industrial residues for combustion is the management of large quantities of ashes contaminated with heavy metals.

A work has been undertaken aiming the partition of heavy metals in burning systems which involved the characterisation of ashes produced in a pilot fluidised bed burning coal and coal mixtures with residues. The study comprises the characterisation of physical and chemical properties of the several ash streams and the comparison of several methodologies to access their leaching behaviour.

The study of the Size Distribution of ashes has been performed through conventional Sieving and compared with Granulometric Distribution by Laser Diffraction in Liquid Suspensions. A study of the size dependence composition was also performed looking at the enrichment of heavy metals.

A TGA was used to obtain fundamental properties of the ashes, as Moisture content and Loss on Ignition and compared with conventional methods.

The mineral content, especially the heavy metals, Cd, Cr, Cu, Ni, Pb, Zn and Mn were measured using conventional AAS and PIXE techniques. Special attention has been dedicated to the measurement of Cl and S in the ashes, using several techniques.

The mobility of the heavy metals present in the ashes was study using agitating Leaching procedures in accordance with TCLP, DIN and a recent European Norm. Also the release of metals was study for several pH and under specific environments using a Sequential Chemical Extraction procedure, that provides some knowledge on the Heavy Metals speciation.