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# **Focused Ultrasound energy over steel slags as a fast tool to assess their environmental risk before and after their reuse in agriculture and civil constructions**

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## **Abstract**

The interest in reusing steel slag in several applications such as aggregate in cement (buildings) and in different road bases, railroad ballast, fertilizer, fill material, etc. has increased. Thus, it is important to know what elements are leached from the slag to the environment in order to evaluate the environmental risk of its reuse. Here we propose a fast leaching test based on focused ultrasound energy (FUS) using a glass probe and Milli-Q water to simulate rain water along time. Our developed method was compared with the conventional EN12457-2 European standard test, and excellent recovery percentages were obtained (0.00054-8% in contrast to 0.00011-0.74% of the European norm). Once confirmed the effectiveness of the developed method (lower amount of sample in the same volume, less operation time, less energy consumption and good recoveries), this procedure was applied to Electric Arc Furnace (EAF) slags used as filler in a forest track 18 years ago. Comparing their concentration values and those of EAF slags recently generated in a steelwork, which were leached in the same way, there was a similar tendency of elemental concentrations in both. However, the samples belonged to the forest track had lower concentration values, possibly due to the highest exposition to the environment. Therefore, we concluded that the developed method could predict the potential risks in terrestrial ecosystems (surrounding soils, rivers, etc.) and for the human health based on the concentration of potentially hazardous elements (heavy metals, toxic trace elements, metalloids, etc) present in the slag when it is in contact with rainwater.

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