

Publication

Quantitative analysis of heavy metals in automotive brake linings: A comparison between wet-chemistry based analysis and in-situ screening with a handheld X-ray fluorescence spectrometer

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Two extraction procedures for ecologically relevant elements present in automotive brake linings (Sb, Bi, Pb, Cd, Cr (total), Co, Cu, Mo, Ni, Sr, V, Zn, Sn) were developed and validated, applying a high pressure asher (HPA-S) and microwave extraction, respectively. Both of these methods allowed for the quantitative analysis of the extracted elements by inductively coupled plasma optical emission spectrometry (ICP-OES). The results were compared to measurements using a handheld energy-dispersive X-ray fluorescence spectrometer (ED-XRF), being in discussion by regulating agencies as in-situ screening tool for brake pads. The comparison indicates that the handheld ED-XRF analysis is basically an efficient screening tool for a reliable assessment of trace metal contents in automotive brake pads with respect to legal standards. While a quantitative determination of elements like Cd, Co, Cr, Mn, Mo, Ni, Pb and Sb was achievable, other elements (V, Cu, Bi, Zn, Sn and Sr) could only be determined qualitatively due to the special matrix characteristics of brake pads.

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