Determination of selected elements in catalytic converters using ICP-MS and microwave digestion

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Abstract

Fuels combustion, polluting the atmosphere is a side effect of an engines' work. Increasing ecological awareness has led to constant pursuit of disposing harmful substances properly. Catalytic converters (car catalysts), containing precious metals from the platinum group, including palladium, platinum and rhodium, have been commonly adopted for this purpose. These critical elements can be found in many raw materials used frequently throughout the economy. Therefore, it is economically viable to retrieve these elements from, among the others, spent catalysts, so they can be reused to manufacture new converters. In order to determine a possible cost of spent car catalyst, it is essential to use the analytical techniques to determine elemental content in any given sample. X-ray fluorescence spectroscopy (XRF) is an example of such a technique. It is nevertheless advisable to use a complementary procedure to confirm any results obtained. A cross-verification technique was developed using inductively coupled plasma mass spectrometry (ICP-MS). This procedure was verified using comparative studies, which confirmed its usefulness and correctness.

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Keywords

ICP-MS; car catalyst; catalytic converter; microwave digestion; circular economy

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