

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

**Methods for elemental analysis of PM samples collected on aluminum foils: results of an inter-comparison exercise**

**This is the author's manuscript**

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1712160> since 2019-09-20T17:44:51Z

*Publisher:*

Società chimica italiana, gruppo giovani

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

## **Methods for elemental analysis of PM samples collected on aluminum foils: results of an inter-comparison exercise**

Eleonora Conca,<sup>a,b</sup> Ornella Abollino,<sup>b</sup> Agnese Giacomino,<sup>c</sup> Mery Malandrino,<sup>b</sup> Agusti Sin,<sup>d</sup> Florence Vivier,<sup>d</sup> Jana Kukutschová,<sup>e</sup> Rafael Bartrolí,<sup>a</sup> and Fulvio Amato<sup>a</sup>

<sup>a</sup> *Institute of Environmental Assessment and Water Research (IDÆA-CSIC), C. Jordi Girona 18-26, 08034-Barcelona, Spain*

<sup>b</sup> *Department of Chemistry, University of Turin, Via P. Giuria 5, 10125-Turin, Italy*

<sup>c</sup> *Department of Drug Science and Technology, University of Turin, Via P. Giuria 9, 10125-Turin, Italy*

<sup>d</sup> *ITT Motion Technologies, Via S. Martino 87, 12032-Barge, Italy*

<sup>e</sup> *VŠB - Technical University of Ostrava, 17 listopadu 2172/15, 70800-Ostrava, Czech Republic*

Aluminum is the most common substrate in studies using PM impactors for the measurement of the number or weight of ambient air particles, as its characteristics ensure high collection efficiencies and cut-points equal to the ones declared by manufacturers. Nevertheless, the use of aluminum foils is not recommended when one of the purposes of the study is the analysis of the metal content of the sample [1,2]. The objective of this work was to develop an efficient elemental analytical procedure for the removal and acid digestion of particulate samples collected on aluminum foils by means of a cascade impactor, in order to perform the analysis of metals.

Two procedures were optimized, by using different digestion and analysis techniques; both procedures were then applied to the two halves of several Dekati Low-Pressure Impactor (DLPI) samples, and results were critically compared. Both the procedures include the removal of samples from the supports by using small cotton wads wet with nitric acid. The efficiency of the removal process was proved by further cleaning of aluminum foils after the removal of samples, while the efficiency of the digestion procedures was tested by means of two different CRMs. Passing-Bablok regression was used for method comparison, and the two procedures resulted to be not significantly different at a confidence level of 95% [3]. The choice of the cotton type and the leaching of cotton wads resulted crucial for the accurate determination of alkali and alkaline earth metal content in PM samples.

[1] Dekati Ltd., Substrates and filters for Dekati® impactors (vers 6.3), in Dekati® Accessory. 2016.

[2] A. Noel, G. L'Espérance, Y. Cloutier, P. Plamondon, J. Boucher, S. Philippe, C. Dion, G. Truchon, J. Zayed, *J. Occup. Environ. Hyg.* **10** (2013) 155-172.

[3] H. Passing, W. Bablok, *J. Clin. Chem. Clin. Biochem.* **21** (1983) 709-720.