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

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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.