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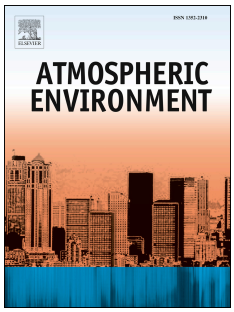

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Level, potential sources of Polycyclic Aromatic Hydrocarbons (PAHs) in particulate matter (PM_{10}) in Naples

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Keywords

Particulate Matter; PAHs; Principal component analysis; Diagnostic ratio; Toxic equivalent factors; Health risk assessment

ABSTRACT

In Naples, particulate matter PM_{10} associated with polycyclic aromatic hydrocarbons (PAHs) in ambient air were determined in urban background (NA01) and urban traffic (NA02) sites.

The principal objective of the study was to determine the concentration and distribution of PAHs in PM_{10} for identification of their possible sources (through diagnostic ratio - DR and principal component analysis - PCA) and an estimation of the human health risk (from exposure to airborne TEQ). Airborne PM_{10} samples were collected on quartz filters using a Low Volume Sampler (LVS) for 24 h with seasonal samples (autumn, winter, spring and summer) of about 15 days each between October 2012 and July 2013. The PM_{10} mass was gravimetrically determined. The PM_{10} levels, in all seasons, were significantly higher ($P<0.001$) in the urban-traffic site (NA02) than in the urban-background site (NA01). The filters were then extracted with dichloromethane using an ultrasonicator (SONICA) to perform a detailed characterization of 12 priority PAHs proposed by the USEPA, by gas chromatography-mass spectrometer (GC-MS) analysis.

The concentration of Benzo[a]Pyrene, BaP (EU and National limit value: 1 ng m^{-3} in PM_{10}), varied from 0.065 ng m^{-3} to 0.872 ng m^{-3} in spring time (NA01) and from 0.120 ng m^{-3} during autumn time to 1.48 ng m^{-3} of winter time (NA02) with four overshoots.

In NA02 the trend of Σ_{12} PAHs was comparable to NA01 but were observed higher values than NA01. In fact, the mean concentration of Σ_{12} PAHs, in urban-traffic site was generally 2 times greater than in urban-background site in all the campaigns.