

SIZE DISTRIBUTION OF PARTICLE-BOUND *n*-ALKANES AND POLYCYCLIC AROMATIC HYDROCARBONS AT AN URBAN MEDITERRANEAN LOCATION

Galindo, Nuria *Miguel Hernandez University, Spain*
Montse Varea, *Miguel Hernandez University, Spain*
Juan Gil-Moltó, *Miguel Hernandez University, Spain*
Carolina Chofre, *Miguel Hernandez University, Spain*

Background and Aims: Different studies have demonstrated that the hydrocarbons present in the atmospheric particulate matter (PM), specifically those with anthropogenic origins, are primarily associated with particles smaller than 1.5 μm and, as such, pose elevated risks to human health. These studies have been conducted in highly populated and industrialised cities, in which the fine particle concentration to the total atmospheric particulate matter is very elevated. In the south Spanish Levant, however, the contributions of coarse particles ($>2.5 \mu\text{m}$) from natural phenomena, like resuspension or Saharan intrusions, can be very significant. This could change the hydrocarbon contribution to different size fractions of suspended particles.

Methods: PM₁, PM_{2.5} and PM₁₀ samples collected with low volume samplers (2.3 m³/h) at two sites in the city of Elche (southeastern Spain) from October 2008 until March 2009 were analyzed to determine the concentrations of 11 polycyclic aromatic hydrocarbons (PAHs) and *n*-alkanes from C₂₀ to C₄₀. One sampling site, classified as urban background, was located on the roof of a building at the Miguel Hernández University, adjacent to a major city avenue, in a highly ventilated area. The other was placed at a palm tree garden in the city centre.

Results: Average total PAH concentrations were 0.99, 1.36 and 1.16 ng/m³ for PM₁, PM_{2.5} and PM₁₀, respectively. The dominant PAHs in the three size fractions were benzo[*b*]fluoranthene, benzo[*k*]fluoranthene and chrysene, representing ~ 40% of the total PAH content. The benzo[*a*]pyrene equivalent concentration, used as an indicator of the PAH toxicity, was 0.11, 0.13 and 0.11 in PM₁, PM_{2.5} and PM₁₀, respectively. Mean total *n*-alkane levels in PM₁, PM_{2.5} and PM₁₀ were, respectively, 14.0, 20.2 and 21.3 ng/m³. The *n*-alkanes C₂₉ and C₃₁ were the most abundant congeners in PM₁₀, while PM₁ and PM_{2.5} fractions were dominated by *n*-alkanes C₂₃-C₂₅. The average CPI (carbon preference index), similar for all size fractions, was ~ 1.5. The plant wax contribution to odd carbon numbered homologues was 37% for PM₁₀ and ~ 31% for PM₁ and PM_{2.5}.

Conclusions: Approximately 70% of PAHs were mainly associated with submicron particles ($<1 \mu\text{m}$) which can easily reach the alveolar region of the respiratory system increasing their potential health effects. The major source of PAHs in the city was traffic since the most abundant congeners (benzo[*b*]fluoranthene and benzo[*k*]fluoranthene) have been identified as tracers of vehicle emissions.

CPI values and percentages of plant wax *n*-alkanes showed predominant contributions of anthropogenic sources during the cold season, although biogenic emissions must not be considered negligible, especially in inner city sampling sites with high vegetation.