

WORKPLACE EXPOSURE TO TRAFFIC-DERIVED NANOSCALED PARTICULATES

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Background and Aims: Ambient air emissions of sub-micron particles infiltrate into indoor environments and play a major role in occupational exposure (Martuzevicius et al., 2008). Discriminating between particles of indoor vs. outdoor origin is therefore essential when assessing indoor air quality in urban environments. Our study aimed to determine occupational exposure to traffic-derived nanoscaled particulates in a typical Mediterranean environment.

Methods: Sub-micron particles were monitored by means of a multi-angle absorption photometer (MAAP) and a laser spectrometer (GRIMM 1107), providing black carbon (BC) and PM₁ concentrations, respectively. The studied laboratory is located on the 5th floor of an 8-storey building in an urban background environment in Barcelona, Spain. The laboratory was not in use during the study period. Windows were kept closed at all times. Indoor BC and PM₁ concentrations were compared with ambient BC and PM₁ levels from an outdoor monitoring station.

Results: Results evidenced the major impact of outdoor vehicular traffic emissions on indoor particulates: 70% of indoor BC and 73% of indoor PM₁ originated from outdoor emissions. This was probably due to inadequate insulation of the building. Outdoor/indoor penetration ratios were relatively constant for BC (1.29 ± 0.08) but not for PM₁ (1.95 ± 0.38).

Conclusions: In occupational exposure assessment studies, it is advisable to monitor the variability of the penetration factors as a function of time in order to accurately discriminate the contribution to indoor air quality of particulates originating from indoor and outdoor sources. Printing and photocopying contributed with 25-30% (546 ng/m³) of total indoor BC. Dust re-suspension by worker passage was the main source of PM₁ (15-20%, 1.1 µg/m³). Workplace exposure to indoor pollutants was determined during day and night work-shifts.

References:

Martuzevicius, D., Grinshpun, S.A., Lee, T., Hub, S., Biswas, P., Reponen, T., LeMasters, G., 2008. Traffic-related PM_{2.5} aerosol in residential houses located near major highways: Indoor versus outdoor concentrations. *Atmospheric Environment*, 6575–6585.