Organic Compound Characterization and Source Apportionment of Indoor and Outdoor Quasi-ultrafine PM in Retirement Homes of the Los Angeles Basin

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Quasi-ultrafine particulate matter (PM$_{0.25}$) and its components were measured in indoor and outdoor environments at four retirement communities in the Los Angeles basin, CA, as part of the Cardiovascular Health and Air Pollution Study (CHAPS). The present study focuses on the characterization of the sources, organic constituents and indoor and outdoor relationships of quasi-ultrafine PM.

The average indoor / outdoor ratio of most of the measured PAHs, hopanes and steranes were close to- or slightly lower than- 1. The indoor-outdoor correlation coefficients (R) were always positive and for most of these components it was quite high (median R was 0.60 for PAHs and 0.74 for hopanes and steranes). Conversely, indoor n-alkanes and n-alkanoic acids concentrations were generally higher than outdoor levels (in some cases up to ~30 times), and median R values were low (0.27 and 0.19 for n-alkanes and acids, respectively). This suggests that indoor sources influenced the indoor levels of these two important compound classes significantly, whereas indoor PAHs, hopane and steranes were mainly of outdoor origin.

Regarding secondary organic aerosol, generally higher levels were measured indoors than outdoors (up to ~8 times).

The Chemical Mass Balance (CMB) model was applied to speciated chemical measurements of quasi-ultrafine PM for both indoor and outdoor datasets including the following sources: High Duty Vehicles (HDV), Light Duty Vehicles (LDV), Biomass Burning (BB) and Ship emissions. Vehicular sources had the highest contribution among the apportioned sources for both indoor and outdoor particles at all sites (on average 1.67 to 4.86 $\mu$g/m$^3$ of the quasi-UF mass) (Figure 1). These results highlight the significance of outdoor mobile sources on indoor environments and indicate that particles from mobile sources infiltrate indoors with high efficiency.

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