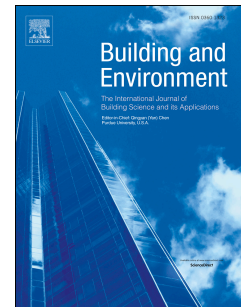


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Indoor particle age, a new concept for improving the accuracy of estimating indoor airborne SVOC concentrations, and applications

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Abstract

To appropriately assess exposure to indoor semi-volatile organic compounds (SVOCs), an accurate relationship considering the non-equilibrium sorption behavior between their gas-phase concentration (C_g) and particle-phase concentration (C_{sp}) is necessary. The reasons are: (1) the equilibrium model frequently used in previous studies may result in significant errors because the time that particles stay in the indoor air is often much shorter than the critical time for C_g - C_{sp} equilibrium; (2) several dynamic models developed previously took the mean residence time of indoor airborne particles as the time duration of the mass transfer between SVOCs and particles in the indoor environments, which may obviously reduce their accuracy because residence time varies among individual particles, and the C_g - C_{sp} relationship and residence time are not linearly correlated. Therefore, we present a new concept, indoor particle age (the time that airborne particles have spent since entering the room), and develop a “ η -particle age model”: the C_{sp}/C_g value can be obtained by multiplying the equilibrium result by a modification factor, η (which is a function of indoor particle age, particle size distribution and the critical time for C_g - C_{sp}

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