

Comprehensive Analysis of Organic Micro-pollutants in Ambient Air Particulate Matter in Hanoi

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Abstract – Air pollution is the most serious environmental issue in Vietnam, particularly in big cities. Air pollutants that are set as environmental standards are regularly monitored by the public institutions. Whereas environmental data on organic micro-pollutants (OMPs) in atmospheric particulate matters (APMs) is limited. Here, we determined the frequency and concentrations of 970 OMPs in 48 air particle samples collected by means of high-volume air sampling in Hanoi, Vietnam, by using a target screening method and a gas chromatography-mass spectrometry database. A total of 118 compounds (12.2% of the target compounds) were detected at least once in the samples, and the number of chemicals detected in each sample ranged from 85 to 103 (median, 92). Sixteen PAHs were detected at high concentrations in nearly 100% of the samples. A total of 41 pesticides (16 fungicides, 6 herbicides, 19 insecticides) were detected, among them, 35 pesticides are firstly found in APMs in Vietnam. Endocrine-disrupting chemicals (i.e., bisphenol A, 4-nitrophenol) and pharmaceuticals and personal care products (diethyltoluamide, caffeine) were detected in over 90% of the samples. Seven sterols, five phthalate compounds and five organophosphorus flame retardants were detected in the samples. The Hazard Quotients and Hazard Indices of pesticides calculated for adults and children were less than 1, indicating that health risk of detected pesticides would be negligible. This is the first comprehensive survey of OMPs adsorbed on atmospheric particulate matter in Vietnam, and as such, this study provides important new information about the frequency and concentrations of atmospheric OMP contamination.

Keywords: Target screening analysis; LC-QTOF-MS-SWATH; Organic micro-pollutants; Air particle; Risk assessment