Evaluating the Use of Local PAH Emissions Data for Identification of Pollution Emission Sources

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) are persistent organic pollutants (POPs) that are composed of two or more fused aromatic rings with only carbon and hydrogen. PAHs are emitted by incomplete combustion and pyrolysis of organic matter in different distributions depending on the source. This study aims to use the different PAH profiles from various emission sources to identify sources of pollution in ambient air. $PM_{2.5}$ samples from of local emission sources - sports utility vehicles (SUVs), light utility vehicles (LUVs i.e., jeepneys), rickshaws (i.e. tricycles), and traditional cookstoves – will be collected using dilution tunnels and tactical air samplers. The samples will then be analyzed for PAH content. The PAHs will be isolated with solvent extraction using DCM with ultrasonication and cleaned up with column chromatography with fully activated silica gel. The samples will then be concentrated using nitrogen blowdown before undergoing GC/MS analysis. The resulting PAH concentrations will be used to construct PAH profiles, to calculate common diagnostic ratios (DR), and will undergo principal component analysis (PCA). The effectiveness of PAH profiles, DRs and PCA as tools for source attribution will be evaluated using PAH data from ambient air samples.

Keywords: PAHs, POPs, pollution markers, air quality, local emission sources