

ANALYSIS OF CHARACTERISTICS AND SOURCES OF PM₁₀-BOUND PAHs IN TIANJIN City

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Background and Aims: Polycyclic aromatic hydrocarbons (PAHs) are a series of certain compounds, many of which have proven to be mutagenic and/or carcinogenic. This study elucidates the temporal and spatial distribution of PM₁₀-bound PAHs in Tianjin, as well as their possible sources and healthy impacts, to provide a baseline reference on exposure assessment, health risk, and pollution controlling in such a densely populated city.

Methods: Atmospheric PM₁₀ samples were collected at 8 sampling sites in Tianjin City every six-day from September 2009 to August 2010. The mass concentrations of 16 PAHs loaded in PM₁₀ samples were measured by GC-MS method. PAHs ratios, PCA and PMF methods were applied for source identification.

Results: The results shows that the total mass concentrations of PM₁₀-bound PAHs ranged from 10.91 ng m⁻³ to 1988.81 ng m⁻³, while the average concentration was 41.91 ng m⁻³ in spring, 24.56 ng m⁻³ in summer, 129.78 ng m⁻³ in autumn and 355.32 ng m⁻³ in winter. Vehicle exhaust was recognized to be a most significant PAHs contributor in both summer and winter, while and the contribution of coal combustion increased in winter.

Conclusions: The total mass concentrations of PM₁₀-bound PAHs varied temporally and spatially at a remarkable extent, with a higher concentration in winter and a lower one in summer, while concentration was the highest in industrial area. With more complex molecular structures, PAHs species with four and more rings composed most of the PAHs concentrations, namely, four-rings in winter and five and six-rings in summer. Coal combustion, vehicle exhaust and steel industry emission were identified to be three major sources of PM₁₀-bound PAHs, however, in summer there may existed more other sources such as biomass combustion and refinery.

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