

Title : Correlations and Concentrations of Sugars Detected in Particulate Matter Samples Collected from Chiang Mai, Thailand

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ABSTRACT

Atmospheric aerosols are vital components reflecting both anthropogenic and biogenic activities. Sugars in particulate matter are key organic compounds with strong potential as tracers for emission sources. However, studies on their size-dependent distribution remain limited. This study investigated the concentrations, compositions, and correlations of sugars in aerosols categorized by aerodynamic diameters into five size fractions: $PM_{0.1}$, $PM_{0.5}$, $PM_{1.0}$, $PM_{2.5}$, and PM_{10} . The relationship using Pearson correlation coefficient of sugar alcohol compounds, anhydro sugars, mono-/disaccharides in Chiang Mai from May to August 2025 using ion chromatography technique with pulse amperometric detector was studied. The results showed that $PM_{2.5}$ has the highest average concentration, about 42% of total particulate mass. The total sugar concentration was also highest in $PM_{2.5}$ (176.17 ng m^{-3}), dominated by sugar alcohols, particularly mannitol and arabitol, which are tracers of biogenic sources such as fungal spores. Correlation analysis in fine particulate ($PM_{0.1}$ - $PM_{1.0}$), there was a relationship between sugar alcohols and anhydrosugars, while in small particulate ($PM_{2.5}$) has strong positive correlations between levoglucosan, sucrose and glucose ($r = 0.85$ and 0.81) respectively. Indicating the co-occurrence of compounds influenced by both biomass burning and biological processes. Additionally, in coarse particulate (PM_{10}), negative relationship was found in sugar alcohols and anhydrosugars. The results could be reflecting the effect of leaching processes and moisture absorption properties of coarse dust, which are important factors affecting the persistence of sugars in the atmosphere. These results contribute to the understanding of the dynamics of atmospheric dust under the rainfall season in northern Thailand.

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