



Source of Personal Exposure to PM_{2.5} among College Students in Beijing, China

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Abstract:

The health risk from exposure to airborne particles arouses increasing public concern in Beijing, a megacity in China, where concentration of PM_{2.5} frequently exceeds the guideline values of World Health Organization (WHO). To investigate daily exposure to PM_{2.5}, a personal exposure study was conducted for college students. The purpose of this study was to measure the daily PM_{2.5} personal exposures of students, to quantify the contributions of various microenvironments to personal exposure since students spend more than 85% of their time indoors, and to apportion the contributions of PM_{2.5} indoors origin and outdoor origin. In this work, a total of 320 paired indoor and outdoor PM_{2.5} samples were collected at eight types of microenvironments in both China University of Petroleum (suburban area) and Tsinghua University (urban area). The microenvironments were selected based on the time-activity diary finished by 1500 students from both universities. Simultaneously, the air exchange rate was measured in each microenvironment. PM_{2.5}, elements, inorganic ions and polycyclic aromatic hydrocarbons in the samples were determined. The peak concentrations were observed in dinning halls, whereas PM_{2.5} in dormitories was the largest contributor to personal exposure because students spend more than half of a day there. Furthermore, source apportionment by positive matrix factorization (PMF) will be carried out to understand the source of personal exposure to PM_{2.5}. Especially, efforts will be put on determining the contributions of primary combustion, secondary sulfate and organics, secondary nitrate, and mechanically generated PM, which present different infiltration behavior and are indoor PM_{2.5} of ambient origin, with help of air exchange rate data. The results would be benefit for refining the understanding of the contribution of PM_{2.5} of ambient (outdoor) origin to the daily PM_{2.5} personal exposures.

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