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Temporal trend of particulate PAHs at Seoul, Korea

Hyun Hee Lee (1), Ji Yi Lee (2), Seung Muk Yi (1), Yong Pyo Kim (2), and Chang Hee Kang (3)

(1) Department of Environmental Health, Graduate School of Public Health, Seoul National University , (2) Department of Environmental Science and Engineering, Ewha Womans University, (3) Department of Chemistry and Research Institute for Basic Sciences, Jeju National University

Temporal trend of particulate PAHs concentration in 2006 - 2007 in the atmosphere of Seoul was investigated to figure out the change of PAHs concentration in the atmosphere by comparison with the results of Lee et al. (2011), Atmos. Res., 99, 50-56, which reported the ambient particulate PAHs concentration at Seoul in 2002-2003.
In this study, the routine measurement of 21 individual particulate PAH compounds in PM10 was carried out between 2006 and 2007 and annual average concentration of total PAHs ($\sum$21 PAHs) at Seoul in 2006 – 2007 was 20.36 $\pm$ 20.29 ngm-3, ranging between 1.28 and 81.2 ngm-3. It showed typical seasonal variation of particulate PAHs concentration in which winter is maximum and summer is minimum. The average concentration of total PAHs in winter (42.21$\pm$21.38 ngm-3) was one order higher than that in summer (3.63$\pm$1.63 ngm-3). This is due to increase of fossil fuel usage for heating, and decrease of photolytic degradation and the enhancement of atmospheric inversion layers by the change of meteorological condition.
It was observed that annual average concentrations of total PAHs in PM at Seoul has not significantly changed within five year. However, the average concentrations in winter and summer significantly decreased in 2006-2007 compared with those in 2002-2003. This might be related with the reduction of local emission of PAHs at Seoul and/or the long range transport of PAHs from outside of Seoul (Lee and Kim (2007), Atmos. Chem. Phys., 7, 3587-3596), which was suggested that significant source of particulate PAHs at Seoul during winter. Thus, decrease of particulate PAHs concentration in winter in 2006-2007 might be correlated with the change of emission strength of outside of Korea. Another possible reason of the decrease of particulate PAHs concentrations in winter and summer at Seoul might be the reduction of local emission around Seoul. The Korean Ministry of Environment established the 'Special Act on Metropolitan Air Quality Improvement' whose principal objective is to improve the PM10 annual concentration in Seoul Metropolitan Region from 60 μgm-3 in 2005 to 40 μgm-3 by 2014 since January 2005. Thus, it is inferred that the observation of lower concentration in summer and winter in 2006-2007 than those in 2002-2003 is related to this strategy. In this study, the major reasons for the reduction of particulate PAHs concentration at Seoul in 2006-2007 will be further discussed by comparison with the emission inventories of Korea and other countries near Korea and applying principal component factor (PCF) and backward trajectory analysis.