EFFECTS OF COARSE PM ON THE NON-EQUILIBRIUM PARTITIONING BETWEEN GAS AND PARTICLE PHASE PAHS

Y.S. Shin[1], D.S. Lee[2], J.S. Kim[3], J.G. Kim[3], **S.H. Kim**[4]
[1]*Policy Research Division, Korea Environment Institute, Seoul, Korea*
[2]*GSES, Seoul National University, Seoul, Korea*
[3]*Department of Environmental Engineering, Chonbuk National University, Chonju, Korea*
[4]*Department of Environmental Engineering, Yonsei University, Wonju, Korea*

A series of airborne PAHs measurements were performed at central urban and remote sites in Seoul, Korea from September 2001 to November 2002. This paper will present findings of the non-equilibrium behavior of PAHs during the campaign experiments and its implication on the uncertainty of input parameters in modeling such as multimedia environmental fate model. Size segregated concentrations of particulate matters and PAHs in particle-phase as well as in gas-phase were measured. Geometric mean diameter (GMD) of particle-phase PAHs and size segregated gas-particle partition constant (Kp) were calculated in order to address the particle size dependence of Kp and the effect of coarse particles on non-equilibrium partitioning between gas and particle-phase PAHs. At the sampling sites and/or events with more fraction of coarse particles, steeper slope and larger y-intercept of logP-GMD plot were obtained indicating the rapid sorption of lower molecular weight PAHs (LPAHs) whereas slower sorption of higher molecular weight PAHs (HPAHs) onto the coarse particles. Throughout all particle size range, the slopes of logP-logKp plot consistently deviated from equilibrium value of -1. Distinctively lowered Kp for HPAHs over the coarse particle range was a major cause of the non-equilibrium behavior. These findings suggest that airborne HPAHs are likely in non-equilibrium with particles whereas LPAHs are rather in equilibrium. Estimation of Kp assuming equilibrium state may not be validated and thus cause significant discrepancy between the measured and estimated ones especially for HPAHs and at the sites and/or events with abundant coarse particles.