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GAS TO PARTICLE PARTITIONING OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) IN TWO REMOTE SITES OF WESTERN GREECE.

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EXTENDED ABSTRACT

The atmospheric fate and transport of PAHs is governed by their gas-particle (g/p) partitioning. In the present study particle-bound and gas-phase PAHs were collected during a 12-month survey at two rural sites located in the Eordaia basin in western Greece, where intense lignite burning takes place for electric power generation. Two to six-ring polycyclic aromatic hydrocarbons, included in the US-EPA priority pollutant list, were determined in particulate and gas phase samples. Total suspended particle concentrations (TSP) and ambient temperatures were also measured. The distribution of PAHs between the two phases was investigated. At ambient temperature levels substantial amounts of the lower molecular weight PAHs (two- to three-ring PAHs) were found in the gas phase. Conversely, the five- and six-ring PAHs were mainly associated with the particle phase. Of the four-ring PAHs, fluoranthene and pyrene were mostly found in the gas phase, while benz[a]anthracene and chrysene were distributed almost equally between the two phases. The partitioning coefficient K_P of PAHs, expressed as (F/TSP)/A, where F and A are the analyte concentrations in the particle and gas phases, respectively, in ng/m^3, and TSP is expressed in μg/m^3 was related to their subcooled liquid vapor pressure p_L^o according to the equation $\log K_P = m_r \log p_L^o + b_r$. The regressions of $\log K_P$ vs $\log p_L^o$ for both sampling sites gave satisfying correlations, in the range between 0.5123 to 0.9711, but the slopes and intercepts among the different samples varied greatly. The slopes in all the sampling events were found to be shallower than the suggested value of –1. The deviations from the predicted aerosol behavior that have been observed may be attributed to several reasons such as fluctuations in temperature during sampling, non-exchangeable PAHs on atmospheric particles, non-equilibrium and other thermodynamic factors.

Key words: polycyclic aromatic hydrocarbons (PAHs), gas-to-particle partitioning.