Determination of particle-associated nitro-PAH using HPLC/chemiluminescence detection system

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The concentrations of several kinds of nitrated polycyclic aromatic hydrocarbons (nitro-PAH), such as 1-nitropyrene (1-NP), 2-nitropyrene (2-NP), 2-nitrofluoranthene (2-NF), and 2-nitrotriphenylene (2-NTP), in the soluble organic fraction of airborne particles were determined by the column switching HPLC-chemiluminescence detection system. The HPLC system consisted of four pumps, a six-ports switching valve, two separation ODS columns, a Pt/Rh column for the reduction of nitro-PAH, a concentration column, and a chemiluminescence detector. Airborne particulate sample collection was performed every 3 hours to clarify their diurnal variation in a non-polluted rural area and in a slightly polluted residential area. In the residential area, the diurnal variation of the concentration of 1-NP was similar to those of NOx (= NO + NO2) and CO, which were primarily emitted from combustion processes such as diesel-powered vehicles, while the concentration of 2-NF, which is produced by atmospheric reactions, showed different patterns of the diurnal variability. On the other hand, in the rural area, the change of nitro-PAH including 2-NF in concentration was accompanied by those of NOx and CO. Results suggest that the concentrations of particle-associated nitro-PAH observed at the rural area are mainly controlled by the transportation of the air mass including the gaseous air pollutants. In this study, the obtained diurnal variations of the nitro-PAH concentration are classified into some patterns, and the individual variabilities will be discussed in relation to their controlling factors such as photochemical reactivity, meteorological conditions, and so on.