Seasonal Changes in Nonylphenol Ethoxylates and Their Metabolites in Water and Sediment of Urban River Polluted by Nonylphenol

Mamoru Motegi*, Kiyoshi Nojiri, Shigeo Hosono and Kiyoshi Kawamura

Center for Environmental Science in Saitama, 914 Kamitanadare, Kisaimachi Kitasakitamagun, Saitama 347-0115, Japan

(Received May 22, 2006; accepted November 8, 2006)

*E-mail: a0191338@pref.saitama.lg.jp

Key words: nonylphenol, nonylphenol ethoxylates, nonylphenoxy acetic acids, urban river, seasonal changes

The concentrations of nonylphenol (NP), nonylphenol ethoxylates (NP\textsubscript{n}EOs: \textit{n} = 1 –15) and nonylphenoxy acetic acids (NP\textsubscript{m}ECs: \textit{m} = 1–10) in river water and sediment were determined seasonally at four sampling sites in the Kamo River, which is a typical urban river and was already known to be polluted by NP. In the water, the concentrations of NP, NP\textsubscript{n}EOs and NP\textsubscript{m}ECs ranged from 0.13 to 3.65 \textmu g/L, from 1.0 to 22.4 \textmu g/L, and from 0.6 to 8.5 \textmu g/L, respectively. NP, nonylphenol monoethoxylate (NP\textsubscript{1}EO), nonylphenol diethoxylate (NP\textsubscript{2}EO), nonylphenoxy acetic acid (NP\textsubscript{1}EC) and nonylphenol monoethoxy acetic acid (NP\textsubscript{2}EC) were predominant in the water. In the sediment, the concentrations of NP, NP\textsubscript{n}EOs and NP\textsubscript{m}ECs ranged from 69 to 10,747 \textmu g/kg dry weight (dw), from 74 to 6,101 \textmu g/kg dw, and from 24 to 673 \textmu g/kg dw, respectively. NP, NP\textsubscript{1}EO and NP\textsubscript{2}EO were predominant in the sediment. The total concentrations of NP, NP\textsubscript{n}EOs and NP\textsubscript{m}ECs in both river water and sediment were higher in winter and spring than in summer and autumn. In the river water, the ratio in concentration of the sum of NP, NP\textsubscript{1}EO, NP\textsubscript{2}EO, NP\textsubscript{1}EC and NP\textsubscript{2}EC to the whole nonylphenolic compounds was correlated with water temperature. The surveyed results suggested that some point emission sources of nonylphenolic compounds were located in the river basin between the first sampling site and the second sampling site.