

Distribution of certain chlorobenzene isomers in marine sediments from the southeastern coastal areas of Korea

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Introduction

Chlorobenzenes (CBs) are ubiquitous hydrophobic chlorinated organic compounds in the environment. These compounds are used as de-ordants, solvents and pesticides, as well as byproducts of agro- or petro-chemical related manufacturing processes, such as PCBs and pentachlorophenol, or of biodegradation of lindane (Newhook and Meek, 1994). Unlike some organochlorine (OC) compounds, including polychlorinated biphenyls (PCBs) and various pesticides, CBs are not banned from production or use in any country. Hexachlorobenzene (HCB) of CBs is widespread pollutants in various environmental compartments such as water, air, soil, birds, fish, human milk, adipose tissue, and blood (Taguchi et al., 1989; Tanabe et al., 1993; Kelly and Campbell, 1994; Hermanson et al., 1997). HCB residue in the environment is predominantly industrial byproducts, which originate from the manufacture of chlorobenzene, carbon tetrachloride, trichloroethylene, tetrachloroethylene, polyvinyl chloride, and nitroso rubber. Thus, the traditional emphasis in investigations in environmental distribution has been only on HCB. This investigation is the first effort for chlorobenzene isomers in Korean coastal ecosystem. The aim of this work was to investigate the levels of certain chlorobenzene isomers including HCB in marine sediments from the southeastern coasts of Korea.

Material and methods

Surface sediments (0-5 cm) were twice sampled from 21 stations in Pohang, Busan, Ulsan and Jinhae coasts of Korea in February and September 2000. Sediments were collected either with a Van Veen grab or box-corer sampler and

then kept frozen at -20°C until analysis. The freeze-dried sediments were sieved at 2 mm and then extracted in a Soxhlet apparatus with 200 ml of toluene for 20 hours. The volume was reduced to 1-2 ml in a rotary evaporator. The extract was transferred to *n*-hexane and adjusted to a volume of 10 ml after a spike of 4 species internal standard (MCBS, Wellington Laboratories, Canada). Samples were cleaned up on a multi-layer silica gel column chromatography with *n*-hexane. The eluants were concentrated to less than 1 ml, and left at room temperature for one day to evaporate to 50-100 µl. The residues were dissolved with 50 µl of *n*-nonane and then analyzed by GC/MSD (Agilent 5973N).

Results and discussion

Eight chlorobenzenes (out of a total of 12 in the congener series) were measured in the sediments from 21 stations in the southeastern coastal areas of Korea. The levels of total chlorobenzene isomers varied between 2.08 and 12.45 ng/g dry weight. The highest contents of total chlorobenzenes (CBs) were found in the sediments from Pohang coast. Trichlorobenzenes were dominant classes among four congener groups, whereas tetrachlorobenzenes and pentachlorobenzene were low levels. The contributions of total CBs showed similar patterns for all stations with positive significant correlation within CBs species. It means that CBs contamination in the southeastern coasts of Korea came from the similar source.

References

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