

해양환경-P9 Butyltin compounds in the aquatic environment of Gwangyang Bay, Korea

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1. Introduction

Because of its ability to cause toxicity at very low water concentrations, the use of tributyltin (TBT) has been restricted since 1980s in many countries (Meador, 1997). Nevertheless, TBT remains an important pollutant in areas with high ship traffic. Recent studies have shown the widespread occurrence and accumulation of butyltin compounds in the sediment and organism (Kannan and Falandysz, 1997). In Korea, the use of TBT-based paints on fishery facilities and small vessels was banned in 1999. This study was initiated to investigate the distribution and patterns of BTs (butyltins) compounds in the aquatic environment such as seawater, sediment, trap and plankton and to explore the historic inputs in Gwangyang Bay which is one of polluted coastal areas in Korea.

2. Materials and Methods

Samples were collected from Gwangyang Bay in April and September 2001: seawater (7 stations), sediment (35 stations), core sediment (1 station), sediment trap (2 stations) and plankton (the mouth of the bay). The samples were immediately transported to the laboratory in a cooler box with ice or dry ice. Seawater was analyzed in the laboratory within a week. Other samples were stored -20°C and later freeze-dried. The analytical procedure was performed after combing and modifying the procedures of Wade et al. (1988) and Harino et al. (1992). Briefly, water samples and the freeze-dried samples were extracted with 0.1% tropolone-methylene chloride, propylated with Grignard reagent and then purified by Florisil column. Triphenyltin chloride was spiked before extraction as surrogate standard. The extract eluted with n-hexane was concentrated and tetrabutyltin (internal standard) was added. The butyltin level was determined on a Hewlett-Packard 6890 gas chromatograph (GC) with a flame photometric detector. The recovery in the reference material was more than 90% for TBT.

3. Results

Tributyltin (TBT) was detected at 1 station of 7 stations in seawater and 18 stations of 35 stations in sediment. The highest concentration of TBT in sediment exhibited at the site near Yeosu Harbour (53 ng Sn/d dry wt). The mean concentrations of BTs compounds decreased as follows: sediment plankton (260 ng Sn/g dry wt) > trap (23 ng Sn/g dry wt) > (8 ng Sn/g dry wt). With regard to the composition of BTs, the contributions of TBT were different according to the environment compartment. The dominant compound in plankton was TBT, while that in trap and sediment changed from TBT to monobutyltin (MBT). Butyltin compounds in core sample showed a dramatic decline with increasing depth, suggesting the degradation of TBT to DBT and MBT (Venkatesan et al., 1998). The results demonstrated that the levels of all butyltin species in Gwangyang Bay were in the lower range relative to other coastal sediments with intensive activities such as harbour and shipyard (Shim et al., 1999).

Reference

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