

Source and Fate of PCB in the Sea Sediment

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Concentrations of polychlorinated biphenyls (PCBs) in sediment were determined for horizontal and vertical distribution in Harima-nada and Osaka Bay. Level of PCB in water, sediment, air and rain were obtained and used to determine PCB fluxes to sea. PCB fluxes to Harima-nada were estimated to be 17 ug /(m^2 year).

In water environment, volatilization and sedimentation of the contaminants from water body are important. Measurements in the sediment cores of Osaka Bay / Harima-nada indicate that the polluted fine particulate can act as a source of PCBs to the water environment. Environmental samples such as ambient air, water, sediment core were determined for PCDD/Fs, PCBs and PCNs using congener specific analysis.

The factors affecting the concentration of PCB in the sea sediment can given as (1) the distance from sources, (2) particle size of sediment particle, (3) physico-chemical property of sediment particle, (4) geographical feature of sea bottom, (5) residual flows.

PCB had been used for about 20 years from 1954 to 1972 in Japan. The production amount of PCB is almost known by year for each product type, and PCB congeners are persistent organic pollutants in environment. Therefore PCB is considered as a very useful index to deduce the diffusion of PCB in sediments. Residual isomeric profile of these congeners in the environmental sample reflects the general abundance of isomer component of their commercial products.

Polychlorinated biphenyls (PCBs) consist of 209 possible congeners and had been widely used as carbon free papers, ship bottom paint, transformer oils because of their chemical, and biological and thermal stability. Due to the serious impact to the ecosystem, the use and production of PCBs ceased in 1972 and liquid-PCBs were withdrawn from their users. About 10% of PCB in Japan was treated using complete degradation in National project. The PCBs diffusion into the environment by prior uncontrolled release and their long-term stability has caused impact to biological system through bio-magnification with food chains. We focused on the environmental distribution of PCBs, include Co-PCBs, which were determined.

In environmental samples, congeners of #5(2,3-)/#8(2,4'-), #11(3,3'-), #12(3,4-)/#13(3,4'-), #15(4,4'-). #22(2,3,4'-), #35(3,3', 4-), #37(3,4,4'-) #70(2,3',4',5-), #66(2,3',4,4'-), #56(2,3,3',4'-), and #77(3,3',4,4'-) are increasing compare with technical PCB.

Homologue distributions and congener profiles appear to play an important role in the estimation of origin as fingerprint for various types of PCB. It makes possible to interrupt the result using more detailed analysis for all congeners of PCB/PCN/PCDD/PCDF. Change of important feature for PCB isomer profile in the sea-sediment was reported.