

Determination of POPs in the Marine Environment Using Various Passive Sampling Devices.

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Persistent organic pollutants(POPs) are one of the many toxic organic compounds found in the environment. POPs can enter the environment through natural and anthropogenic sources. Also, the presence of POPs in marine ecosystems has a harmful impact on marine organisms and can also potentially harm humans.

The use of passive samplers has emerged as an effective method for determining environmental concentrations of pollutants with greater precision. Passive samplers can directly measure the freely dissolved concentration of pollutants, which can be applied to living organisms. Moreover, the time-weighted average concentration of pollutants during a deployment period can be represented through passive sampling, providing a distinct advantage over conventional methods.

In this study, three types of passive sampler were introduced according to the absorption mechanism of passive sampler applied to the atmosphere and marine environment. The first-generation passive sampler has based on kinetic absorption and consists of limiting and receiving phases. The second-generation passive sampler is based on equilibrium partition between two phases, uses performance reference compounds and consists of a single-phase membranes. The third-generation passive sampler uses towing and high-speed rotation to reach an equilibrium fast. In this study, second and third-generation passive sampler devices applicable to seawater, sediment, and atmosphere were developed using Low-density polyethylene (LDPE) and applied. LDPE was used as a single-phase passive sampler in this study due to its physicochemical advantages over other passive samplers and its use in global monitoring programs.

The passive sampling method has several advantages over conventional techniques for analyzing contaminants in the marine environment. This method is low-cost, does not require expensive or complicated equipment, and does not need additional power and maintenance. Furthermore, the passive sampler can detect and analyze contaminants at very low concentrations and can investigate environmental concentrations of pollutants on regional and global scales. In this study, different types of passive sampling devices using LDPE were developed and applied in the marine and atmospheric environment to evaluate their utility and potential