Environmental Monitoring by Bio-Indicators

Worldwide pollution by Persistent Organic Pollutants (POP) such as dioxin, PCB and DDT, is today's great concern and requires immediate attention. POPs are toxic; they resist disintegration and are easily accumulated in organisms via the food chain. They spread globally through media such as atmosphere, surface run-off and ocean currents and also by migration of various animal species such as fish.

Sieving of soil samples

Dr. Shin Takahashi, Associate Professor of Environmental Chemistry at CMES says: "The tropical Asian region plays a prominent role in supplying volatile pollutants on a global scale. It acts as an evaporating pan because of the hot climatic conditions." Toxic elements are categorized by their physical characteristics; some types are deposited in soils and spread gradually, others get easily volatilized and spread fast through water and air. The rapid economic growth of some Asian countries has lead to increasing chemical pollution and improper waste disposal, which could become the source of a global environmental problem.

In some under-developed Asian countries precious metals are recovered by burning or boiling wasted electronic devices and appliances in nitric acid. These methods lead to a release of various hazardous chemicals including heavy metals, dioxins and other potential POPs like polybrominated diphenylethers into the environment. Dr. Shin Takahashi recently reported that people living in areas of open waste dumping and e-waste recycling may face severe health risks because of the release of pollutants. He uses the RETSCH Analytical Sieve Shaker AS 200 for sieving soil samples from such areas. "Compared to manual sieving, using the AS 200 greatly improves our efficiency," he comments.

The Center for Marine Environmental Studies (CMES), Ehime University, Japan, was established with the prime aim to measure existing pollutants in the marine environment, which is the final recipient of all global pollution, and find ways to control them.

The CMS consists of six major divisions:
- Coastal oceanography
- Environmental chemistry
- Ecotoxicology
- Aquatic biology and ecology
- Marine geology and benthos ecology
- Environmental specimen bank

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Homogenizing of fish samples

POPs spread globally through air and water. They accumulate in high-trophic animals such as whales in very high concentrations. Dr. Takahashi uses RETSCH’s Knife Mill Grindomix GM 200 for the sample preparation of fish. "Homogenizing the samples is an important step in our analyses because deviation of the chemical concentration of a sample directly affects the accuracy of our results. Samples prepared in the GM 200 are very uniform”, he explains. The homogenized samples are then Soxhlet-extracted, passed through clean-up columns and analyzed for POPs and other related chemicals by Gas Chromatography. Dr. Takahashi is very satisfied with the performance of the RETSCH equipment he uses for his analyses.

The CMES is proud of its unique Environmental Specimen Bank for Global Monitoring (es-BANK). This archive contains biological and environmental samples collected all over the world during the last 50 years. The number of samples amounts to over 100,000 covering 1,300 species. These samples are stored in capsules at -25 °C and in liquid nitrogen for the study and verification of historical events of chemical pollution and their impact on wildlife.

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(Dr. Takahashi, CMES)