

Isotope approach for tracking the fate of brominated organic compounds in the environment

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Significant amounts of industrially produced brominated organic compounds (BOCs) are used today as biocides, pesticides, flame retardants, etc. However, many of them have been shown to persist in the environment and have been associated with adverse health effects including cancer, reproductive, developmental toxicity and endocrine disruption. Therefore, the knowledge on their fate in the environment is of the utmost importance.

The main natural processes affecting BOCs in the environment include non-destructive processes such as volatilization and sorption, as well as destructive biotic and abiotic degradation.

During the last years multi-elemental compound-specific isotope analysis (CSIA) has been demonstrated as a powerful tool for understanding the mechanistic aspects of organic contaminants degradation. Recent progress in Br-CSIA make possible a usage of two-dimensional carbon-bromine isotope analysis for studying isotope effects associated with BOCs attenuation.

We aimed to apply C-Br CSIA for the investigation of BOCs degradation at the Ramat Hovav contaminated site in the southern Israel. During our study we performed various laboratory experiments simulating natural biotic and abiotic BOCs degradation, as well as non-destructive attenuation processes and investigated carbon and bromine isotope effects associated with them. As for today, we are trying to pass all the data obtained from the laboratory experiments to the field and estimate to what extent they can be used for BOCs degradation assessment.