

Environmental Monitoring and Risk Assessment: A New View Using Diffusive Passive Sampling Technique (DGT and DET)

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Regulatory environmental monitoring is mainly based on the spot sampling of water, sediment, soil, and biota and conventional analysis. These well-established *ex-situ* conventional methods have limitations and the analysed samples may not accurately reflect the *in-situ* concentrations due to the artefacts resulting from spot sampling, sample oxidation and changes in temperature. Diffusive passive samplers (diffusive gradients in thin films (DGT) and diffusive equilibration in thin films (DET)) overcome these limitations. The research to date in this field has clearly demonstrated the power of applying DGT and DET samplers to investigate contaminant biogeochemistry in water, sediment, and soil systems. We have developed and applied several DGT and DET methods for the analysis of trace metals, sulfide, iron (II), and nutrients in water/sediment/soil. Here we present various examples of the monitoring application of DGT and DET methods to investigate contaminant biogeochemistry in water and sediments. These examples range from the investigation of metal (loid) concentrations in marine sediment pore waters, the measurement of elevated concentrations of iron (II) and sulfide in different habitats. Methods including the Chelex binding layer DGT for measuring trace metals and REEs in marine water, Chelex-Metsorb mixed binding layer DGT for measuring trace cations and oxyanions in sediment pore waters, and the colorimetric iron (II) and sulphide DET methods for the measurement of high-resolution pore water iron (II) and sulfide concentrations are discussed. This work consider current approaches for the assessment of bioavailability of metals in water and sediments, and how DGT stands as a step forward in suite of tools available. These studies demonstrate that the DGT technique has strong potential link chemical monitoring and ecotoxicology to predict contaminant risk.

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