TOTAL REFLECTION X-RAY FLUORESCENCE FOR ENVIRONMENTAL SAMPLES

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Environmental assessment is becoming a more and more pressing issue and with this the importance for analysis of environmental samples. The spectrum of samples is widely scattered and ranges from water and soil to air or plant material. This means an analytical method must be capable for analyzing both bulk and trace material with good reliability and low detection limits. In most cases the amount of sample available for analysis is small, tightening the requirements even more and limiting the choice of methods further. Total reflection X-ray fluorescence as a micro-analytical technique is readily coping with small amounts of solid and liquid material, when dried, and combined with its low detection limits and minor sample preparation it is ideally suited for analysis of environmental samples.

The emphasis of our research is placed on the fate of atmospheric particles and the fingerprints of atmospheric samples including fog, rain and snow. Lake Michigan water presents an interesting topic as well as the lake offers a large surface for introduction of atmospheric constituents and opens the field for flux studies. In all cases different sampling strategies and equipment are required to obtain meaningful results. Atmospheric particles for instance are collected by filtration with a simple filter holder and the collection of fog or cloud water is carried out with a specially designed collector, tested in the laboratory before use in the field.

The concentration of trace elements in these environmental samples provides important information about origin and fate of the sample. This includes transport of particles in the atmosphere, changes in the air mass pattern at the place of collection and enrichment of certain species in water droplets.

By far the most interesting samples, however, are atmospheric particles. The elemental concentration and composition in this samples change frequently according to the current meteorology and reveal unique information about air mass travel and pollution in the area. Particle samples can be also taken with much higher frequency as fog, rain or snow thus providing a more detailed picture as the other ones.