Analytical Chemistry Challenges for Investigation of Sediments

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The determination of heavy metals and persistent organic pollutants present in sediment cores is of great interest in watershed management. The history of a water body can be determined by analysis of depth profiles and the chemical composition of sediments in the different layers. The distribution of heavy metals in sediment cores is used to determine the sedimentation rate and provides information on industrial and anthropogenic influences on the environment. Thus, sources of environmental contamination can still be identified after a long period of time.

Furthermore, the distribution of contaminants in sediment cores is used to determine the age of the sediment layers. The aim of this study is to identify persistent organic pollutants, e.g. DDT and Lindane, and thus determine the age of the most recent sediment layers.

The analysis of sediment is a challenge for scientists in chemical respect, as analytical methods well suited for the analysis of sediment cores have to be designed. Two ways of sample preparation are needed: sample digestion is the preferred way for the determination of inorganic analytes, while different methods are commonly used for organic analytes extractions.

Advanced sample preparation methods are used for the analysis of a variety of chemical pollutants, such as lead, zinc, DDT and Lindane. The main problems that have occurred include small sample volumes, highly contaminated sample matrices and a very large number of samples. Methods have to be sensitive, reliable and fast. Measurements should be automated whenever feasible.

Within this research, methods well suited to these needs have been developed and used for the analysis of sediment cores from Lake Abaya. As a result, trends in the depth distribution of chemical pollutants in the sediment cores have been identified.