

Multimethodological study of trace metal speciation in marine waters

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Most elements occur in seawater in very low concentrations, in traces. Traditionally, the focus of research interest has been on the so-called heavy metals such as Pb, Cd, Cu, Zn, Hg. While knowing the total concentrations of metals is important to determine the general status of water quality, it is even more important to determine their speciation, as the bioavailability and toxicity of metals depends largely on the chemical species in which the metals occur in natural waters. Electrochemical techniques offer both adequate sensitivity and selectivity to determine the concentrations of many trace metals and the ability to provide information on chemical speciation (interaction with natural organic matter). This presentation will focus on the most commonly used voltammetric techniques for analysis and speciation of trace metals in seawater, such as anodic stripping voltammetry and adsorptive cathodic stripping voltammetry (ASV and AdCSV). In addition, the application of the copper ion selective electrode (Cu-ISE) and passive sampling technique for the speciation of trace metals based on diffusive gradients in thin films (DGT) in estuarine waters will be presented. Challenges in their applications and solutions to overcome known obstacles will be discussed. In addition to the capabilities and application of the voltammetric methods themselves, the automation of the measurement and the mathematical treatment of raw voltammograms to improve the overall analytical procedure will also be discussed.