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STRIPPING VOLTAMMETRY WITH SOLID ELECTRODES FOR TRACE ELEMENT DETERMINATION IN NATURAL WATERS. LABORATORY AND FIELD EXPERIMENTS

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Field analytical methods have received extensive attention in the last years because they provide real-time information and eliminate, or at least greatly reduce, the need to transport and store samples in the laboratory [1]. Voltammetric techniques are suitable for field application because the instrumentation is relatively simple and portable instruments are commercially available. The aim of this work was to develop a procedure for the determination of trace elements in field by anodic stripping voltammetry (ASV). In the first part of the study, we investigated the performance of a portable voltammetric analyzer in the laboratory, in controlled conditions. Copper was chosen as pilot analyte and its determination by ASV was studied with several working electrodes: a carbon paste electrode (CPE); a gold nanoparticle-modified glassy carbon electrode (AuNp-GCE); a mercury film electrode (MFE). The best results in terms of repeatability, response linearity and accuracy were obtained with the MFE [2], which was chosen for the subsequent experiments. Water from a stream near Torino (Banna stream) was analyzed by ASV and by graphite furnace atomic absorption spectroscopy (GF-AAS). A good agreement was obtained between the two techniques. In the second step of the study, field experiments were carried out with a mobile laboratory station equipped with the portable voltammetric analyzer, a laptop and a portable battery, placed close to the stream banks. Water was collected from the Banna stream, filtered, acidified and analyzed using the standard addition method. An aliquot of water was then analyzed by GF-AAS in the laboratory, to check the accuracy of the results. The future goals of the research will be the field determination of other metal ions in waters and of the available element concentrations in soils.

References

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