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ABSTRACT BOOK

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INNOVATIVE WATER SAMPLING STRATEGY FOR THE SIMULTANEOUS SAMPLING AND SAMPLE PREPARATION FOR CADMIUM QUANTIFICATION

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The content of certain metal ions in aquatic ecosystems has emerged as an environmental concern, posing significant risks to both aquatic life and human health. Some metal ions, including cadmium, are usually present at a trace level in environmental waters. Nevertheless, even at low exposure levels, cadmium can lead to serious health problems. Its increasing presence in natural waters is largely attributed to its widespread use in products such as batteries and electronic components. Consequently, regular monitoring of water quality is crucial for effective pollution control.

Traditional methods for metal ions assessment in environmental waters usually involve bottle sampling, the addition of some preservatives, and sample treatment, and analyte quantification. However, the sampling and sample preparation procedures can compromise sample integrity due to factors such as temperature variation, UV radiation, oxygen exposure, changes in pH, use of organic solvents, microbial activity, among others. Consequently, sample degradation can introduce uncertainty in the analyte. Besides the potential sample degradation, these processes may increase the time required for analysis and the complexity of the process.

Solid phase extraction (SPE) is one of the widely used techniques for sample preparation, aimed at sample matrix clean-up and/or analyte enrichment. This work presents a novel SPE-based method that integrates both sampling and sample preparation into a single step for cadmium quantification in freshwater. This was achieved by devising a portable column packed with Chelex-100 resin, a weak cation exchange resin that offers high selectivity towards metal ions. For sample collection, the water passes through the column, using a syringe, and, during this step, the metal ions are retained and the water matrix discarded (matrix clean-up). Subsequently, a lower volume of eluent is used to recover the metal ions, promoting in this way the enrichment of the analyte for further analysis (ICP or AAS). This approach takes advantage of the resin's properties to enrich cadmium, which is typically present in concentrations between 3 and 5 $\mu g\ L^{-1}$, often below the limit of detection of several traditional methods.

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