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High-Resolution *In-Situ* Profiling in Lakes with Potentiometric Solid-Contact Ion-Selective Electrodes

Rohini Athavale,[1,2] Nadezda Pankratova,[3] Gaston A.Crespo,[3] Christian Dinkel,[1] Eric Bakker,[3] Andreas Brand,[1,2] Bernhard Wehrli[1,2]

[1]Eawag–Swiss Federal Institute of Aquatic Science and Technology, Department of Surface Waters Research and Management, Switzerland

[2]Institute of Biogeochemistry and Pollutant Dynamics, ETH Zurich, Switzerland

[3]Department of Inorganic and Analytical Chemistry, University of Geneva, Switzerland

rohini.athavale@eawag.ch

Biogeochemical processes are often confined to very narrow zones in aquatic systems. Therefore, highly resolved measurements are required to identify and study such processes. Potentiometric solid contact ion selective electrodes (SC-ISEs) are promising tools for high-resolution *in-situ* profiling in lakes. Still, changes in redox, pH, and light conditions and presence of reactive solutes like sulfide in natural water pose challenges for *in-situ* measurements. We fabricated and tested different designs of SC-ISEs selective to NH_4^+, H^+, CO_3^{2-} using various combinations of transducing materials and membrane matrices. Insensitivity towards conditions of intense light at the surface and high sulfide concentrations in deep waters of eutrophic lakes was achieved by tuning the properties of building blocks of these sensors. By integrating these sensors in a custom-built *in-situ* profiling setup we successfully recorded high resolution EMF profiles in two Swiss lakes during summer stratification. The obtained EMF profiles were converted to concentrations of the target analyte by applying an in-situ calibration protocol based on simultaneous sampling with a syringe sampler during profiling. We also adapted a novel approach for pCO_2 determination that measures the potential of a carbonate selective electrode directly against a pH electrode [1]. The developed system is based on all solid state design, and is superior to conventional CO_2 sensors systems in terms of response time, which is essential for in-situ profiling in a water column.

References

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Simple and Rapid Method for Chronopotentiometric Determination of Metamitron in Water Samples and Pesticide Formulations

Ana D. Đurović,[a] Zorica S. Stojanović,[a] Snežana Ž. Kravić,[a] Zvonimir J. Suturović,[a] Tanja Ž. Brezo,[a] Nada L. Grahovac[b]

[a]University of Novi Sad, Faculty of Technology, Department of Applied and Engineering Chemistry, Bulevar cara Lazara 1, 21000 Novi Sad, Serbia

[b]Institute for Field and Vegetable Crops, Maksima Gorkog 30, 21000 Novi Sad, Serbia

djurovic.ana@tf.uns.ac.rs

This paper describes chronopotentiometric method for determination of herbicide metamitron using thin film mercury electrode and glassy carbon electrode as working electrodes. At both working electrodes one well defined reductive peak appeared in Britton-Robinson buffer. The most important experimental parameters of chronopotentiometry were examined and optimized. Under optimal experimental conditions, the reduction time was linear in the metamitron concentration range of 0.8-30 mg/dm^3, with a detection limit of 68.53 μg/dm^3 using thin film mercury electrode, and in concentration range of 1-30 mg/dm^3, and detection limit of 92.91 μg/dm^3 using glassy carbon electrode. Analytical parameters such as quantification limit, precision, selectivity and robustness were also evaluated. The proposed method was directly applied for quantification of metamitron content in spiked water samples, and several commercial formulations, without sample preparation. Obtained results were in good agreement with those obtained using LC-MS/MS method, or by those labeled by the manufacturer, thus making this method suitable for a routine analysis of complicated environmental samples.