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Design and Pilot Production of a Polish Lake-Water Candidate Certified Reference Material (the MPWN Project)

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Authors Anna Ruszczyńska, Jakub Karasiński, Marcin Wojciechowski, Andrzej Gawor, Olha Dushna, Dominika Łukasik, Ewa Bulska (University of Warsaw, Faculty of Chemistry, Biological and Chemical Research Centre, Warsaw, Poland), Aldona Kubala-Kukuś, Dariusz Banaś (Jan Kochanowski University of Kielce, Institute of Physics, Kielce, Poland)

[candidate certified reference material](#) [CRM production lake water](#) [MPWN Elements](#) [surface water trace elements](#) [water monitoring](#)

Abstract

In the context of European water-monitoring policy, we report a pilot study to develop certified reference material (CRM) for the elemental composition of lake water in Poland. Target measurands and concentration ranges were defined in accordance with the Water Framework Directive, Polish regulations, and the fit-for-purpose needs of monitoring laboratories using instrumentation with diverse analytical performance (from $\mu\text{g}\cdot\text{L}^{-1}$ to tens of $\mu\text{g}\cdot\text{L}^{-1}$ for trace elements and $\text{mg}\cdot\text{L}^{-1}$ for major ions). Although inductively coupled plasma mass spectrometry was used for CRM characterisation, the candidate material was formulated to be compatible with routinely available techniques, including atomic absorption spectrometry, flame emission photometry, inductively coupled plasma optical emission spectrometry, and total reflection X-ray fluorescence. The analyte panel includes Al, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, F, Fe, Hg, Li, Mn, Mo, Ni, Pb, Rb, Sb, Se, Sr, Tl, U, V, Zn, and the major elements Ca, Mg, Na, and K. Following screening of the characteristics of three lakes, the Marksoby site was selected as the source matrix. A 60-L lot was prepared and bottled under controlled conditions (220 units) and evaluated for between- and within-bottle homogeneity to support data comparability. This manuscript documents the selection, preparation, and pre-certification studies. The certification campaign, together with the assignment of certified values and the evaluation of their associated uncertainties, is described in a separate study.

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