Preface

The analysis of nitrate, nitrite, phosphate, and silicic acid, in seawater has been carried out for more than 50 years. The concentrations of nutrients in seawater are important for various oceanographic uses. The climatological distribution of nutrients in the ocean has been established over the past 4 decades. In the 1990s, accurate concentration data for nutrients in seawater were required by oceanographers to detect the temporal variability of ocean nutrients derived from climate change. Although high-accuracy, high-precision methods for nutrient analysis were available in the 1990s, such methods were not applied to analysis of nutrients in seawater, primarily because of a lack of a suitable reference material. In this study, Aoyama et al. have succeeded in preparing a reference material based on natural seawater. This reference material has passed homogeneity and long-term stability tests. To evaluate the reference material, an intercomparison between 18 laboratories was conducted. The results of the intercomparison, summarized in this report, indicate that a reference material is needed to establish traceability of nutrient data from laboratories and that comparable nutrient data sets sufficient for detecting variability can be established in the field of oceanography.

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Abstract

Autoclaved natural seawater was used to prepare samples for an interlaboratory comparison exercise for a reference material for nutrients in seawater. Sample homogeneity was confirmed by repeatability of measurement. Sets of 6 samples covering a concentration range greater than that in previous intercomparisons were prepared. Concentrations were 0 –38 μmol kg^{-1} for nitrate, 0.0–0.9 μmol kg^{-1} for nitrite, 0.1–2.7 μmol kg^{-1} for phosphate, and 2–136 μmol kg^{-1} for silicic acid. A total of 18 sets of samples were distributed to 18 laboratories in 5 countries. Results were returned by 17 laboratories in 5 countries. Although consensus concentrations were obtained for the 6 samples, the standard deviations were 4.5 times and more than 10 times greater than those of the homogeneities for phosphate and silicic acid, respectively. For nitrate, the standard deviations were only about double the homogeneities. These results indicate that variability in in-house standards of the participating laboratories — rather than analytical precision — is the primary source of interlaboratory discrepancy. Therefore use of a certified reference material for nutrients in seawater is essential for establishing nutrient data sets that can be compared across laboratories, especially for silicic acid and phosphate in seawater.

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