Artifact formation of methyl- and ethyl-mercury compounds from inorganic mercury during derivatization using sodium tetra(n-propyl)borate

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Sodium tetra(n-propyl)borate (NaBPr4) was introduced as derivatization reagent to extend the possibility for determining ethyl-mercury compounds. This study investigated the artifact formation of methyl- and ethyl-mercury compounds during NaBPr4 derivatization, together with the influence of this artifact on organomercury analysis in environmental samples. The artifact methyl- and ethyl-mercury compounds during NaBPr4 derivatization were evident and depended strongly on the amount of Hg(II) present in the solution for derivatization. Some unidentified organomercury compounds were found when the amount of Hg(II) in the derivatization solution was over 1 mu g. The amounts of NaBPr4 and acetate buffer and the presence of organometallic compounds other than organomercury showed little influence on the artifact effect. The artifact monoethylmercury encompasses 0.99-2.9% of the amount of Hg(II) present and interferes strongly with the monoethylmercury analysis. The formation rate of artifact monomethylmercury is much lower and ca. 0.03-0.28% of the Hg(II) present. The artifact affects remarkably the monomethylmercury analysis for solid samples when these have a low ratio of monomethylmercury-to-total Hg concentrations (< 0.003) and the recovery of Hg from the samples is high. Mathematical correction seems to be difficult due to the low reproducibility of this artifact effect. Formation of artifact organomercury compounds caused during NaBPr4 derivatization may lead to false Hg speciation and overestimate concentrations of organomercury compounds.
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