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Highly Sensitive Micellar Electrokinetic Chromatography for Determination of Novel Organoborane Antifoulant

Keiichi Fukushi

Faculty of Maritime Sciences, Kobe University

Summary

We describe separation of pyridine triphenyl boron (TPBP) which is used in commercial anti-fouling coatings for both hull and fishnet applications and its decomposition products such as diphenylborinic acid (DPB) and phenylboronic acid (MPB) by capillary electrophoresis (CE). The following analytical conditions were examined: detection wavelength; pH of the background electrolyte (BGE, 9.2-10.5); kinds and concentrations of surfactants added to the BGE (0-40 mM for sodium dodecyl sulfate (SDS) and 0.2-50 mM for tetradecyltrimethylammonium chloride (TTAC)). We also examined the effects of pyridine in the standard solutions of TPBP, DPB, and MPB and capillary length for the separation of these analytes. As a result, complete separation of TPBP and DPB (or MPB) was achieved although DPB and MPB were not separated. The LOD (limit of detection) for TPBP was 7.3 $\mu\text{g/L}$ at S/N of three when 20 mM sodium tetraborate solution containing 20 mM SDS was used as the BGE. The respective values of the RSD (relative standard deviation) of the peak area, peak height, and migration time for TPBP were 1.5, 3.0, and 0.42% (n=8). It was suggested that the proposed CE method could be useful for the investigation of decomposition behavior of TPBP.