

Simultaneous Determination of Iodide and Iodate in Salts

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Summary

Iodine, one of the essential elements for living organisms, plays important role in thyroid hormone synthesis. Low level of thyroid hormones in the blood is responsible for harmful effects of health known as iodine deficiency disorders such as hypothyroidism and goitrous tumor. Excessive intake of iodine also causes similar symptoms. Salt iodization as iodide (I^-) or iodate (IO_3^-) is the most effective strategy to prevent iodine deficiency disorder. It is therefore important to ascertain I^- and IO_3^- in salts to maintain human health. We proposed transient isotachopheresis – capillary zone electrophoresis for simultaneous determination of I^- and IO_3^- in salt samples. The optimum conditions obtained so far as follows. A polyimide-coated fused-silica capillary with 87.4 cm total length (75 cm effective length) and 75 μm I.D. (375 μm O.D.) was used. After the capillary was filled with a background electrolyte (artificial seawater containing 20 mM cetyltrimethylammonium chloride) for 240 s, the sample solution was vacuum-injected (50 kPa) for 5 s (250 nL) into the capillary. Voltage (8.0 kV) was applied for separation with the sample-inlet side as the cathode following an introduction of 500 mM 2-(*N*-morpholino)ethanesulfonate as the terminating ion for 8 s (400 nL). The injection period of 1 s corresponds to the sample volume of 50 nL. The detection wavelength of 210 and 226 nm was respectively adopted for I^- and IO_3^- . When solutions (560 mM Cl^-) containing different concentrations of I^- and IO_3^- were analyzed using the procedure, calibration graphs for I^- and IO_3^- were linear using both the peak area and peak height: a regression equation relating the area response to I^- concentration (x , 0–0.15 mg/L) was $y = 26.8x + 1.05$ (y , peak area (arbitrary units), correlation coefficient, 0.9906); $y = 6.28x + 1.00$, 0.9947) for IO_3^- (0 – 0.30 mg/L as I). The limit of detection ($S/N = 3$) for I^- and IO_3^- respectively reached 0.020 mg/L and 0.095 mg/L. The respective values of the relative standard deviation ($n = 4$) for I^- and IO_3^- were 1.1 and 0.94% (migration time), 6.1 and 4.3% (peak area), and 3.6 and 4.7% (peak height). The proposed method was applied for determining I^- and IO_3^- in commercial salts, but I^- and IO_3^- weren't detected. Further study is necessary to improve the noise level and blank values including sample preparation procedures.