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Rapid and Simultaneous Determination of Tetrafluoroborate, Thiocyanate and Hexafluorophosphate by High-Performance Liquid Chromatography Using a Monolithic Column and Direct Conductivity Detection

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A method was developed for fast and simultaneous determination of tetrafluoroborate (BF_4^-), thiocyanate (SCN^-) and hexafluorophosphate (PF_6^-) by high-performance liquid chromatography using a silica-based monolithic column and direct (non-suppressed) conductivity detection. Chromatographic separation was performed on a Chromolith Speed ROD RP-18e column with tetrabutylammonium hydroxide (TBA) + citric acid + acetonitrile as eluent. The effects of the types of eluent, TBA concentration, acetonitrile volume fraction, eluent pH, column temperature and flow rate on the retention of anions were investigated. The optimized chromatographic conditions were selected. Under the optimal conditions, the baseline separation of BF_4^- , SCN^- and PF_6^- was achieved without any interference by other anions (F^- , Cl^- , Br^- , I^- , NO_3^- , ClO_3^- and SO_4^{2-}). The detection limit ($S/N = 3$) was 0.42, 0.46 and 1.42 mg L^{-1} for BF_4^- , SCN^- and PF_6^- , respectively. The present method was successfully applied to the determination of BF_4^- , SCN^- and PF_6^- in ionic liquids.

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