HPLC METHOD DEVELOPMENT FOR ANALYSIS OF ANION EXCHANGE PRODUCTS OF QUATERNARY AMMONIUM COMPOUNDS

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ABSTRACT

Quaternary ammonium compounds are used extensively for commercial and industrial applications. A facile anion exchange is required for many of these applications. Decomposition of quaternary ammonium methyl carbonates by reaction with an acid makes it a great candidate for the anion exchange process. An anion exchange HPLC method developed for an inorganic qualitative analysis course was adapted for following the progress of the exchange reaction. To alleviate problems with pH drift in the original method, we employed a buffered mobile phase of 5 mM ammonium benzoate/ammonia with a 5μm Hamilton PRP-X200 column. The buffered mobile phase produced a more complex solvent front, but the anions of interest were sufficiently resolved to provide quantitation. Calibration curves based on peak area were linear between 1mM and 100 mM injected concentrations.

Later in the study we discovered that the buffered mobile phase caused column deterioration which resulted in peak splitting. One of those peaks from acetate (primary target ion in this work) overlapped with the primary methyl carbonate peak making quantitation impossible. A naphtholdisulfonate mobile phase (Maki, S. A., and N. D. Danielson. 1991. Indirect photometric chromatography of anions using sodium naphthalenetrisulfonate. Analytical Chemistry 63: 699-703.) provided no improvement in the chromatography. Preliminary analysis employing a new 5μm Allsphere SAX column (Grace) exhibited longer retention times with much improved peak shape. Future efforts in method development will focus on use of this new column.