Ion Analysis: Waters Now Offers More Choices Than Ever 95/06/-06

Waters^{**} Corporation now offers chemists three instrumental ways to analyze ions including single column ion chromatography and chemically suppressed ion chromatography, as well as capillary ion analysis. Capillary ion analysis is the newest advance in ion analysis and is described on pages 1, 8, and 9 in this issue. With the addition of chemically suppressed ion chromatography, Waters is the only HPLC company to offer chemists so many choices for ion analysis.

ION ANALYSIS OPTIONS AVAILABLE FROM WATERS

1 Single Column Ion Chromatography 2 Chemically Suppressed Ion Chromatography 3 Capillary Ion Analysis +

CHEMICALLY SUPPRESSED ION CHROMATOGRAPHY

One of the most frequently performed ion chromatography separations is the analysis of seven target anions in drinking water, as described in the United States Environmental Protection Agency Method 300.0A (Figure 1). It calls for the use of chemical suppression to reduce the eluent conductivity after the separation to enhance detection of the anions. This separation was performed using a Waters 626 LC System with a fluid path constructed of high-performance polymeric materials, in conjunction with a 717plus Autosampler and a 432 Conductivity Detector. The new 432 Detector has an updated five-electrode flow cell with reduced flow path volume and a builtin automatic temperature control system for higher sensitivity and stability.

SINGLE COLUMN ION CHROMATOGRAPHY

Another approach to ion chromatography uses a low conductivity eluent to achieve the separation. As shown in Figure 2, the conductivity of the eluent is low enough so as not to require suppression and the eluent passes directly into the detector from the column. The elution order of the target analytes is the same, although the resolution between the peaks is different from the column/eluent combination used in the suppression mode. The same instrumentation was used to perform the analyses shown in Figures 1 and 2.

ION ANALYSIS BY CAPILLARY ELECTROPHORESIS

Capillary Ion Analysis (CIA) is an electrophoretic separations technique. Ions are separated in a capillary based on their ionic mobility rather







than interacting with an ion exchange packed column. Because of the differences in the separation mechanism, ions elute from the capillary in a different order than ion chromatography. Figure 3 shows the results of a CIA separation on the same anion standard as in Figures 1 and 2. Note the fast, highly-efficient separation in Figure 3. The different selectivity of CIA relative to IC makes it an effective complement to IC for confirming peak identity.

CATION ANALYSIS BY CIA

The speed and resolution of the analysis of cations by CIA is comparable to that of anion analysis by CIA. In both instances (Figure 4) the analyses are completed quickly with minimal delay time between samples since there is no chromatography column to flush or reequilibrate. Changeover from anion to cation analysis takes less than 15 minutes! Similarly, sample preparation requirements are less demanding for CIA than for IC. Since CIA does not use a packed column, any sample components that have not eluted by the

Figure 3: High Speed Capillary Ion Analysis





time the analytes of interest have been detected can simply be purged from the capillary which is then automatically refilled with fresh electrolyte. This operation only requires one to two minutes and consumes about $50 - 75 \mu L$ of electrolyte.

THE CHOICE IS YOURS

Whether you are monitoring treated wastewater or drinking water for ionic contaminants or performing compliance analysis, Waters offers several very powerful options for ion analysis. Waters ion chromatography systems are used for chemically suppressed and single column methods. They are very versatile and fully capable of performing standard and official ion analyses. Waters pioneering approach to ion analysis by capillary electrophoresis, Capillary Ion Analysis, establishes new standards of speed, convenience and

cost effectiveness.

