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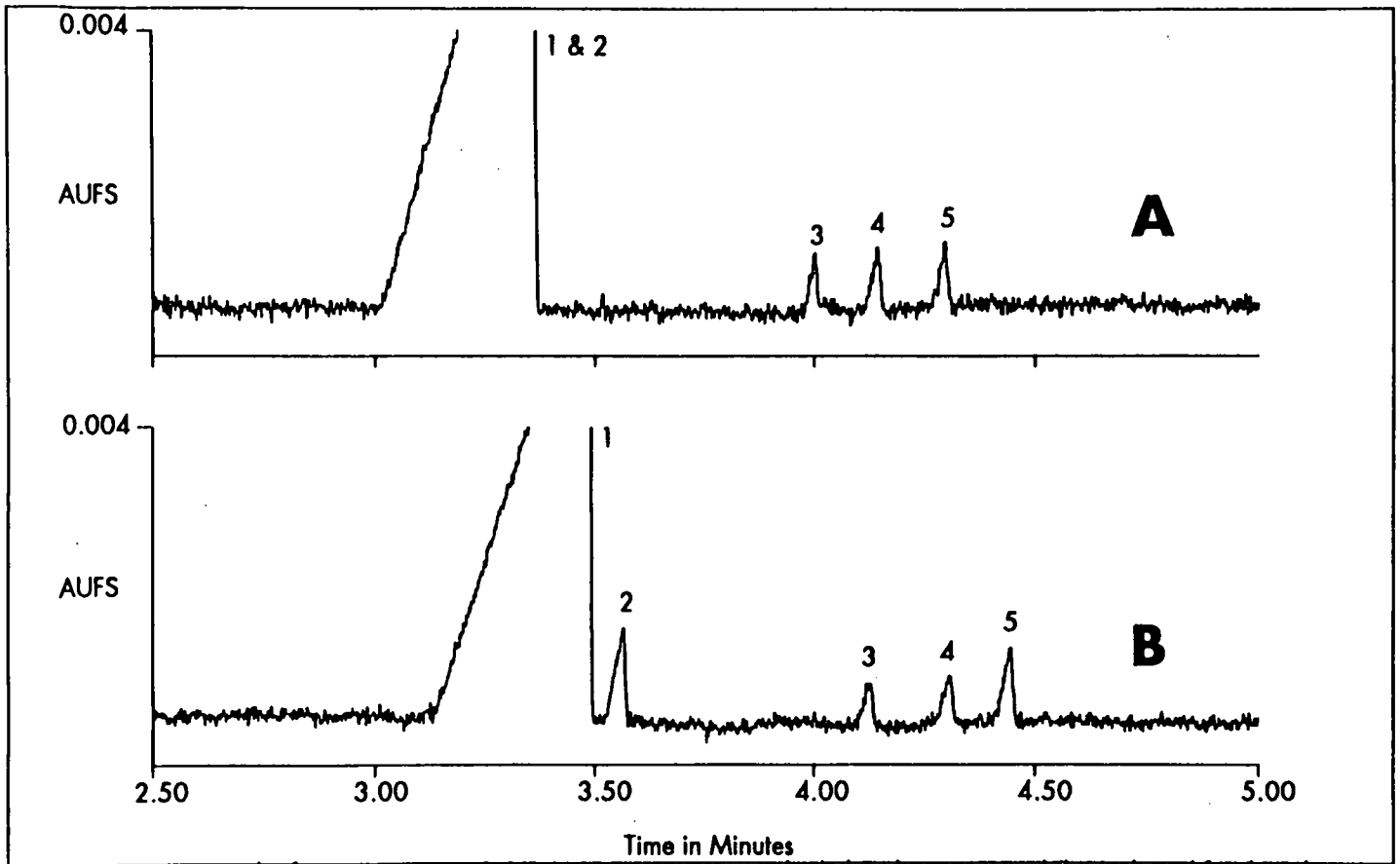
CIA Analysis of Cations in Fermentation Broth: Manipulation of Selectivity



Conditions:

Capillary: AccuSep™ 75 micron by 60 cm

Electrolyte A: 5 mM UVCAT-1, 6.5 mM HIBA, pH 4.4

Electrolyte B: A with 2 mM 18-crown-6-ether

Voltage: 20KV (positive)

Detection: UV @ 185nm (indirect)

Injection: 30 second hydrostatic (10 cm)

Sample: 1/1000 dilution of filtered fermentation broth

Peak ID:
1) Ammonium
2) Potassium
3) Calcium
4) Sodium
5) Magnesium

Monitoring cations in the fermentation process is an important assay in both the pharmaceutical/biotech and food markets. Capillary Ion Analysis (CIA) can be used to monitor these types of compounds in starting materials, during fermentation, and in the effluent following the process. The speed of the analysis and selectivity make this technique an excellent choice to provide quantitative feedback results during the process. Competitive techniques such as IC cannot provide the turnaround necessary for process control. These two separations highlight the manipulation of selectivity through electrolyte additives. In separation A, without the crown ether, ammonium and potassium comigrate. In separation B, with the crown ether, a complex is formed with potassium, altering its migration, resolving it from ammonium.

Objective:

To monitor cations as quantitative feedback for fermentation process control.

Details:

CIA provides quantitative information in a time frame where it is possible to provide process feedback.

System:

Waters CIA Analyzer™
Waters 860 Data Station
Data acquisition rate: 20 pts/sec.
Detector time constant: 0.3 sec.
Sample Preparation: Dilute fermentation broth 1/1000 with Milli-Q® water, filter with Millex®-HA and inject.

References: