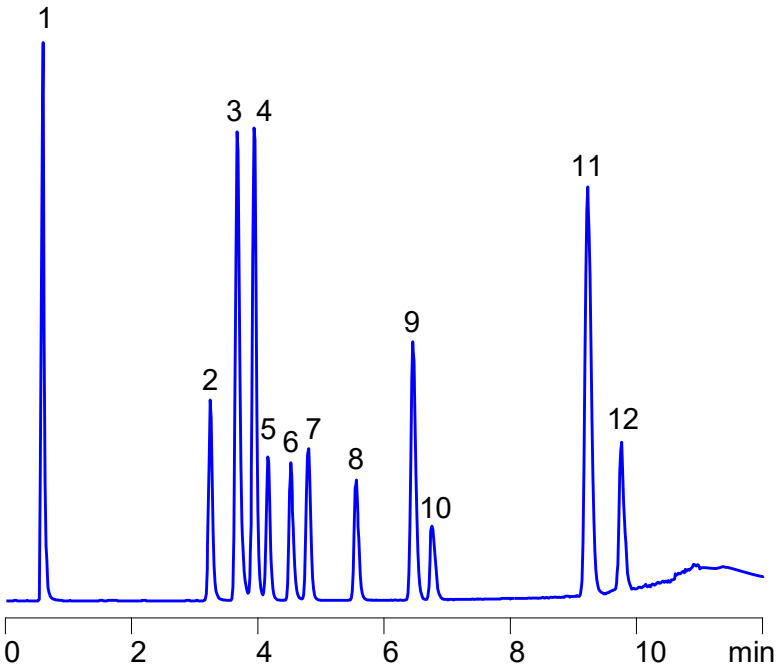
ELSD-HPLC Analysis of Eleven Anions on Amaze HA Mixed-Mode Column



1. Sodium ion
2. Phosphate
3. Phosphite
4. Methanesulfonate
5. Chloride
6. Citrate
7. Bromide
8. Nitrate
9. Iodide
10. Trifluoroacetate
11. Perchlorate
12. Sulfate

Column: Amaze HA
Dimensions: 3.0x100 mm, 3 um, 100A
Mobile phase: ACN/water/Ammonium formate pH 3
Flow rate: 0.8 ml/min
Detection: ELSD, 40ºC

Application Notes

An efficient HPLC-ELSD method was developed for the simultaneous determination of eleven inorganic and organic anions - phosphate, phosphite, methanesulfonate, chloride, citrate, bromide, nitrate, iodide, trifluoroacetate, perchlorate, and sulfate - using the Amaze HA mixed-mode column. The stationary phase combines anion-exchange, hydrophilic interaction (HILIC), and a weak reversed-phase mechanism, providing complementary selectivity for highly polar and multi-charged analytes that lack UV chromophores.

The Amaze HA phase contains protonated amino ligands and polar hydrophilic groups, allowing retention through electrostatic attraction, hydrogen bonding, and dipole interactions, with minor hydrophobic contribution. Separations were carried out using ammonium formate combined with acetonitrile gradients, enabling fine adjustment of ionic and hydrophilic retention components. Baseline or near-baseline resolution was achieved for all eleven anions, with elution governed by charge density, hydration energy, and molecular size. Strongly hydrated, multiply charged species such as phosphate and sulfate eluted last, while small, weakly hydrated anions such as methanesulfonate and chloride eluted earlier.

This study demonstrates the capability of the Amaze HA mixed-mode column for comprehensive anion analysis without the need for ion-pair reagents, offering tunable selectivity, excellent reproducibility, and ELSD compatibility for environmental, pharmaceutical, and inorganic analytical applications.