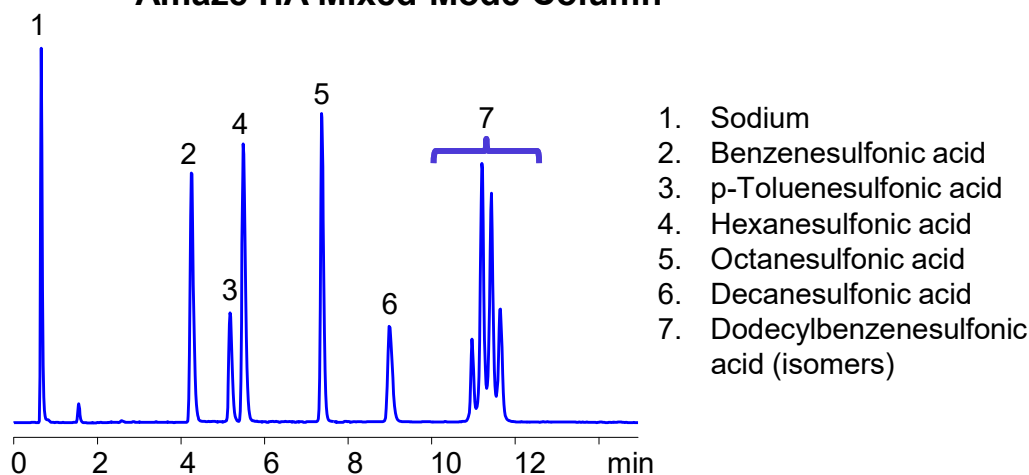


HPLC Separation of Hydrophilic and Hydrophobic Sulfonic Acids on Amaze HA Mixed-Mode Column



Column: Amaze HA
Dimensions: 3.0x100 mm, 3 μ m, 100A
Mobile phase: ACN/water/Ammonium formate pH 3
Flow rate: 0.6 ml/min
Detection: ELSD, 40°C

Application Notes

This HPLC method demonstrates the separation of a mixture of sulfonic acids of varying polarity and hydrophobicity - Benzenesulfonic acid, p-toluenesulfonic acid, hexanesulfonic acid, octanesulfonic acid, decanesulfonic acid, and dodecylbenzenesulfonic acid (isomers) - using the **Amaze HA mixed-mode column**. The **Amaze HA** stationary phase combines reversed-phase and anion-exchange mechanisms, featuring a hydrophobic alkyl chain and a strong anion-exchange group on the same ligand. This dual functionality enables simultaneous retention of both hydrophilic and hydrophobic sulfonic acids in a single chromatographic run.

The hydrophilic, aromatic sulfonic acids—such as Benzenesulfonic acid and p-toluenesulfonic acid—interact strongly through anion-exchange due to their fully ionized sulfonate groups, while their limited hydrophobicity results in shorter retention. The alkylsulfonic acids - Hexanesulfonic, Octanesulfonic, and Decanesulfonic acids - combine hydrophobic alkyl chains with an acidic sulfonate headgroup, producing mixed retention: the sulfonate interacts ionically with the anion-exchange sites, while the alkyl chain engages in reversed-phase interactions. As the carbon chain length increases, the reversed-phase contribution becomes dominant, leading to longer retention times. Dodecylbenzenesulfonic acid, containing both an extended alkyl chain and an aromatic ring, represents the most hydrophobic and strongly retained analyte in the series. It elutes last, often as a group of positional isomers, illustrating the column's ability to resolve subtle structural variations.

The Amaze HA column provides superior selectivity for mixtures containing compounds that differ widely in polarity and hydrophobicity. By adjusting organic content and buffer concentration, retention can be finely tuned between anion-exchange and reversed-phase dominance, enabling comprehensive characterization of complex sulfonic acid mixtures in environmental, industrial, and pharmaceutical applications.