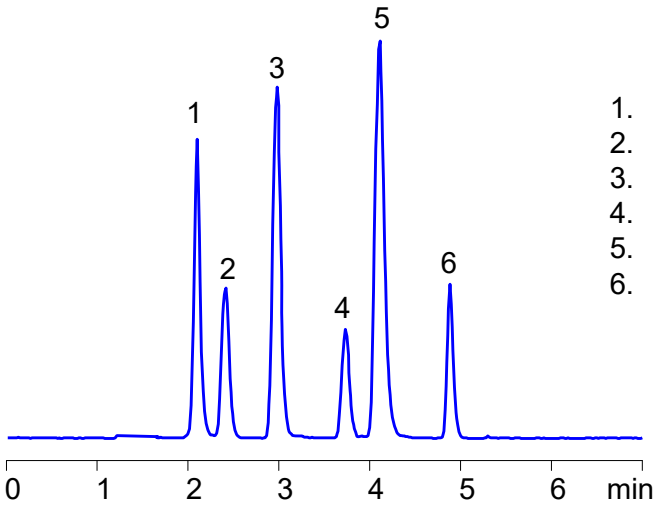
HPLC Separation of Alkylsulfonic and Fluorinated Alkylsulfonic Acids on Amaze TH Mixed-Mode Column



1. Methanesulfonic acid
2. Butanesulfonic acid
3. Hexanesulfonic acid
4. Trifluoromethanesulfonic acid
5. Octanesulfonic acid
6. Perfluorobutanesulfonic acid

Column: Amaze TH
Dimensions: 3.0x50 mm, 3 um, 100A
Mobile phase: ACN from 40% to 80% in 4 min, 2 min hold, 10 mM AmFm pH 3
Flow rate: 0.6 ml/min
Detection: ELSD, 40°C

Application Notes

We developed an HPLC method demonstrates the separation of alkylsulfonic and fluorinated alkylsulfonic acids - methanesulfonic acid, butanesulfonic acid, hexanesulfonic acid, octanesulfonic acid, trifluoromethanesulfonic acid, and perfluorobutanesulfonic acid - using the **Amaze TH mixed-mode column**. The **Amaze TH** stationary phase exhibits multi-modal retention combining HILIC, weak reversed-phase, cation-exchange, and anion-exchange properties. The column features both acidic and basic functional groups separated by a long hydrophilic linker, allowing fine control of retention through mobile phase composition, pH, and ionic strength.

The analytes represent a homologous and functional series of sulfonic acids differing by chain length and fluorination, which directly influence polarity, acidity, and hydrophobicity of the analytes. Methanesulfonic acid, being the smallest and most hydrophilic, is retained primarily by anion-exchange interaction with minimal reversed-phase contribution and elutes first. butanesulfonic and hexanesulfonic acids display increasing reversed-phase retention as the alkyl chain length grows, while still maintaining strong ionic interaction with the stationary phase. Octanesulfonic acid, with a long hydrophobic chain, is dominated by reversed-phase retention, eluting significantly later than shorter analogs.
Trifluoromethanesulfonic acid and perfluorobutanesulfonic acid introduce fluorine substitution, increasing acidity and polarity but reducing hydrophobic interaction. Their enhanced acidity strengthens anion-exchange retention, while fluorination decreases nonpolar interactions, producing distinct elution behavior compared to non-fluorinated analogs.

The **Amaze TH** mixed-mode column provides excellent selectivity for these compounds by balancing hydrophobic and ionic forces. Its dual-mode functionality allows clear resolution of alkyl and fluorinated sulfonic acids across a wide polarity range, making it ideal for environmental, industrial, and analytical studies of sulfonate-based contaminants and additives.