

Maximum Concentration of Ammonium Fluoride in a Mobile Phase - Tips and Suggestions

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Overview

Ammonium fluoride is sometimes added to mobile phases for LCMS analyses because it can significantly increase signal intensity and improve signal-to-noise ratios. However, when working with Cogent TYPE-C™ columns, its use must be carefully controlled.

Studies show that fluoride ions interact aggressively with TYPE-C surfaces, causing measurable column damage when used at elevated concentrations. This damage begins to appear around 5 mM, which is high enough to negatively affect silica hydride column stability and longevity. In contrast, the ammonium portion of the salt is not problematic—evidenced by the fact that ammonium acetate can be safely used up to 16.5 mM without adverse effects.

To protect the stationary phase, the recommended upper limit for ammonium fluoride is 2 mM, with 1–2 mM being the preferred operating range. Staying within this window provides the LCMS sensitivity benefit while minimizing risk to the column.

Ammonium fluoride is sometimes used as a mobile phase additive in LCMS applications to improve signal-to-noise, particularly when working with polar analytes. When using Cogent TYPE-C™ silica hydride columns, the recommended maximum concentration is approximately 2 mM.

Our internal testing has shown that concentrations around 5 mM can cause detectable damage to TYPE-C columns. To avoid this degradation, we recommend limiting ammonium fluoride to no more than 1–2 mM.

The negative effects originate from the fluoride ion, not the ammonium counter-ion. For comparison, additives such as ammonium acetate have been used safely at much higher levels—up to 16.5 mM—without harming the column. This difference reinforces that the fluoride component is responsible for column deterioration.

For best performance and column longevity, maintain ammonium fluoride at 1–2 mM, and avoid higher concentrations whenever possible.

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