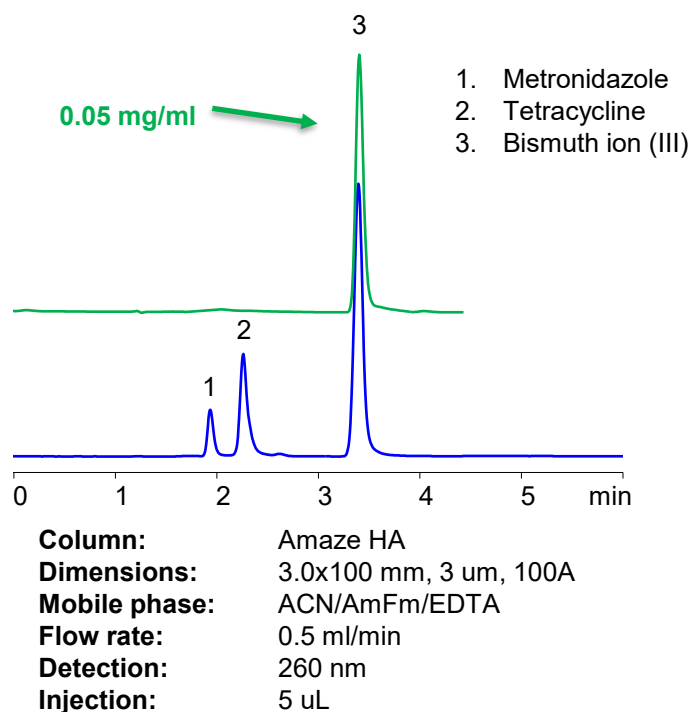


New High Sensitivity Bismuth Analysis Using Mixed-Mode HPLC and UV Detection



Application Notes

A novel high-sensitivity chromatographic method was developed for simultaneous analysis of metronidazole, tetracycline, and bismuth ion in complex pharmaceutical formulations on **Amaze HA mixed-mode column**. The separation is achieved on a mixed-mode HPLC column combining reversed-phase and anion-exchange retention mechanisms, enabling precise resolution of both organic and inorganic components under a single chromatographic run. Direct UV detection of bismuth is challenging due to its lack of intrinsic chromophore. To overcome this limitation, ethylenediaminetetraacetic acid (EDTA) was introduced as a visualization reagent forming a stable, UV-active bismuth - EDTA complex. This complexation reaction enhances the absorbance signal and allows detection of bismuth at low-micromolar levels without interference from matrix components. The same chromatographic conditions provide efficient separation of metronidazole and tetracycline, both exhibiting characteristic UV spectra that facilitate identification and quantitation.

The optimized method demonstrates excellent reproducibility and linearity across a broad concentration range for all three analytes. Recovery values above 98% confirm high analytical accuracy, while the **Amaze HA mixed-mode stationary phase** ensures good peak symmetry and minimal carryover. This approach eliminates the need for multiple detection techniques or pre-column derivatization steps. The combination of mixed-mode selectivity and in-situ complex formation establishes a sensitive, robust, and cost-effective platform for routine quality control of multi-component bismuth-based pharmaceutical formulations.