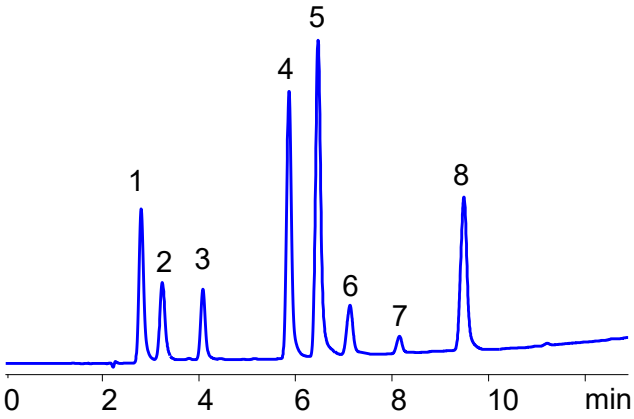
HPLC Analysis of Metamizole-Lidocaine-Ampicillin Formulation on Heritage MA Mixed-Mode Column



1. Impurity (Metamizole)
2. Lidocaine
3. Ampicillin
4. Guaifenesin
5. Chlorpheniramine
6. Maleic acid
7. Impurity (Metamizole)
8. Metamizole

Column:	Heritage MA
Dimensions:	4.6x150 mm, 3um, 100A
Flow rate:	1 ml/min
Mobile phase:	ACN and ammonium formate gradient
Detection:	255 nm

Application Notes

A reversed-phase mixed-mode HPLC method was developed for the simultaneous determination of metamizole, lidocaine, ampicillin, guaifenesin, chlorpheniramine, and maleic acid using the Heritage MA mixed-mode column. These compounds are commonly co-formulated in veterinary and injectable preparations for analgesic, antibiotic, antipyretic, and antihistaminic purposes. Their structural and physicochemical diversity - ranging from highly polar acids to amphiphilic amines - makes simultaneous quantitation challenging on conventional reversed-phase columns.

Biologically, metamizole is a non-opioid analgesic and antipyretic prodrug; lidocaine serves as a local anesthetic and anti-arrhythmic agent; ampicillin provides broad-spectrum antibacterial activity through β-lactam inhibition of cell-wall synthesis; guaifenesin acts as an expectorant and mild muscle relaxant; chlorpheniramine is a first-generation H_1 antihistamine; and maleic acid functions as a counter-ion and pH stabilizer, often forming salts with basic drug components.

The **Heritage MA** stationary phase combines reversed-phase hydrophobic ligands with positively charged ion-exchange sites, providing anion-exchange and cation-exclusion selectivity. This architecture allows simultaneous retention of neutral, basic, and acidic compounds within a single run. Basic drugs such as lidocaine and chlorpheniramine are retained mainly by hydrophobic partitioning, while acidic species - maleic acid, ampicillin, and metamizole anions - interact electrostatically with the positively charged sites.

The **Heritage MA mixed-mode column** demonstrated broad selectivity and robustness for complex multi-drug veterinary formulations, supporting accurate analysis of both ionic and neutral active ingredients.