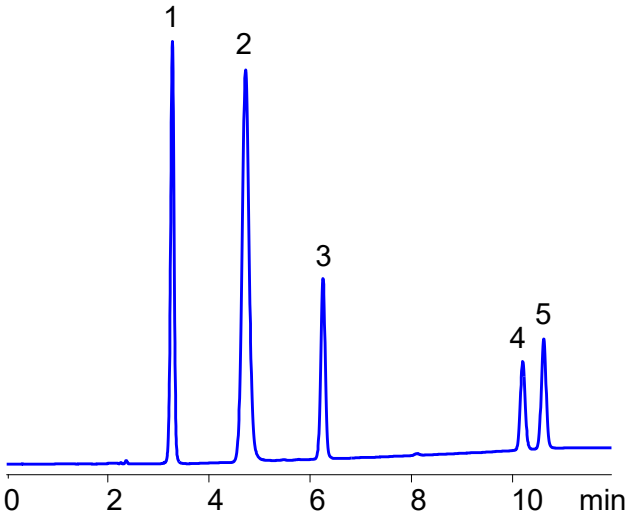
HPLC Analysis of Metamizole Formulation on Heritage MA Mixed-Mode Column



1. Ascorbic acid
2. Chlorpheniramine
3. Guaifenesin
4. Maleic acid
5. Metamizole

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

Application Notes

HPLC separation of a multicomponent pharmaceutical formulation containing metamizole, ascorbic acid, chlorpheniramine, guaifenesin, and maleic acid was achieved on the Heritage MA mixed-mode column. Heritage MA integrates reversed-phase (RP), anion-exchange (AX), and cation-exclusion (CX) interactions on a single ligand: a hydrophobic chain provides RP retention, while a strong anion-exchange group on the surface binds anionic species and electrostatically repels cations. This combination enables simultaneous resolution of acidic, basic, and neutral components within one run by tuning organic strength, buffer pH, and ionic strength.

Metamizole (dipyrone), a weak acid with moderate hydrophobicity, is retained primarily by reversed-phase partitioning; when partially deprotonated, it gains additional anion-exchange retention, giving controllable selectivity with pH/ionic strength. Ascorbic acid, included as an antioxidant to protect labile ingredients from oxidative degradation, is highly polar and strongly acidic; it is captured predominantly by anion-exchange, with minimal RP contribution, and its retention decreases with higher salt due to AX screening. Chlorpheniramine, a protonated basic antihistamine, provides antiallergic relief in the formulation. On Heritage MA it experiences cation-exclusion (electrostatic repulsion from the positively charged AX sites) and is therefore retained mainly by reversed-phase hydrophobic interaction; its elution is governed by organic content rather than buffer salt. Guaifenesin, a neutral expectorant, shows moderate RP retention and negligible ionic interaction, eluting between strongly polar acids and highly hydrophobic species. Maleic acid functions as a counter-ion/stabilizer and pH adjuster; as a doubly deprotonated dicarboxylate under acidic-to-neutral conditions, it is strongly retained by anion-exchange, typically eluting before more hydrophobic acids once salt competes for the AX sites.

By combining RP, AX, and CX in a single stationary phase, the Heritage MA column delivers distinctive selectivity and sharp peak shapes across disparate chemistries, enabling precise, simultaneous quantification and stability assessment of all formulation components in one robust method.