

Evolution of Mixed-mode HPLC: Are We There Yet?



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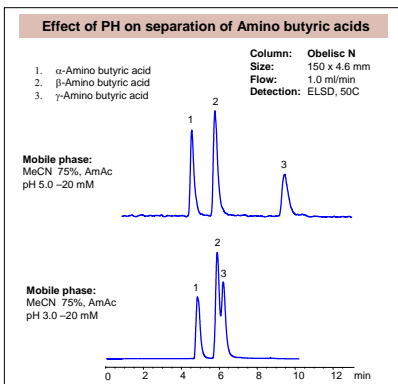
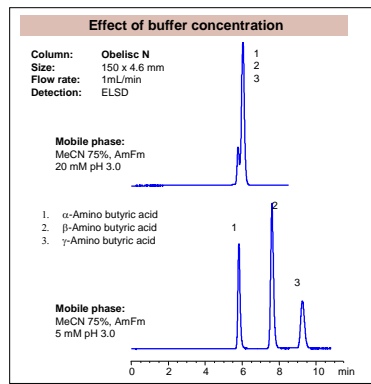
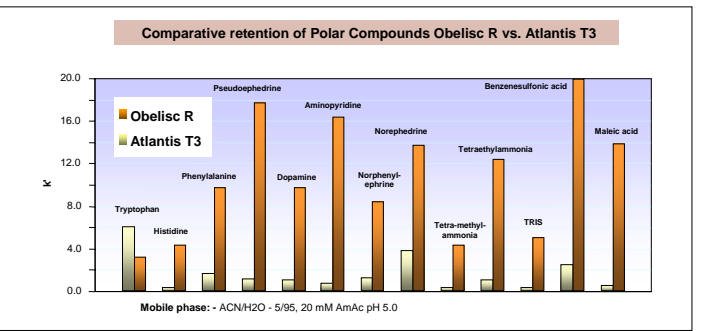
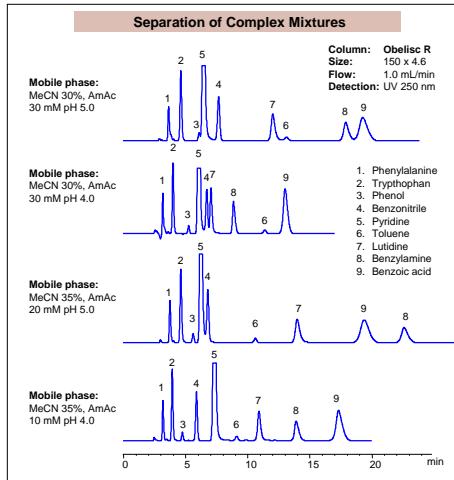
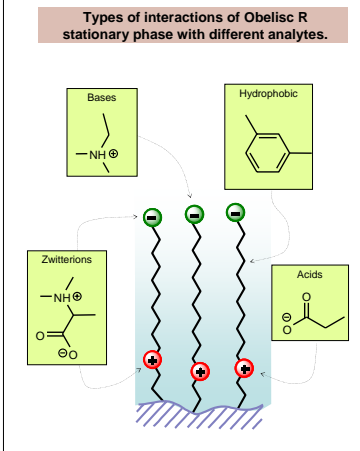
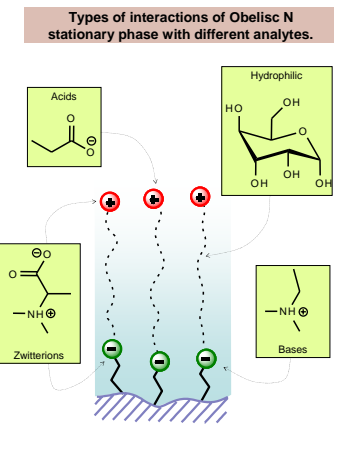
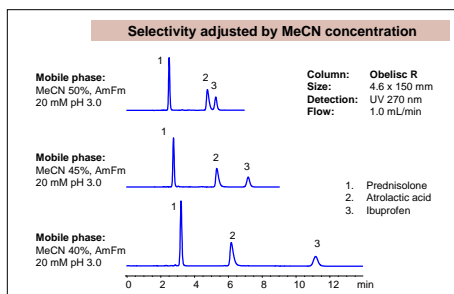
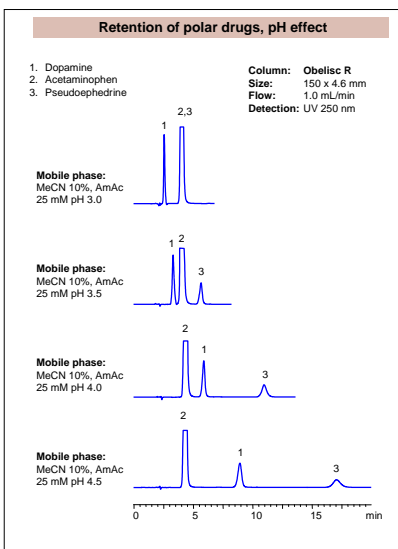
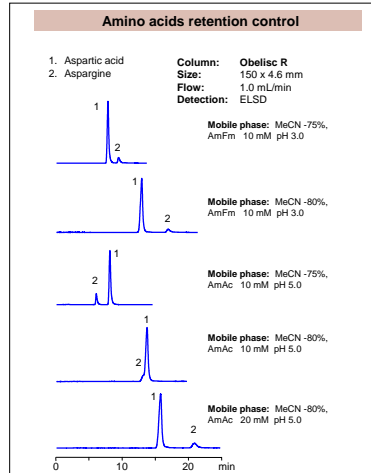
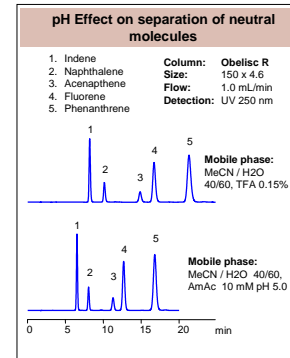
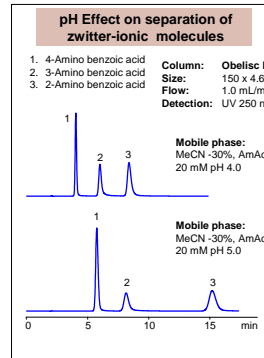
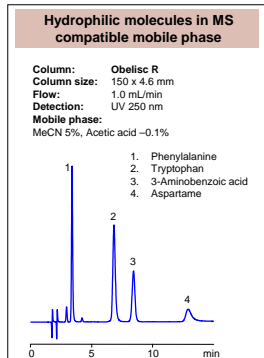
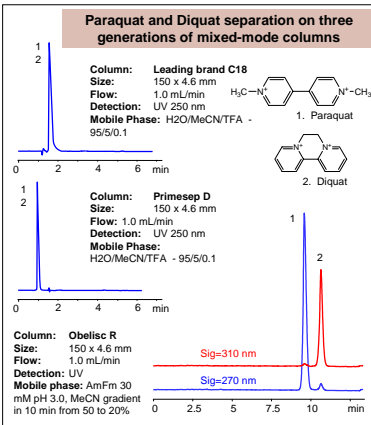
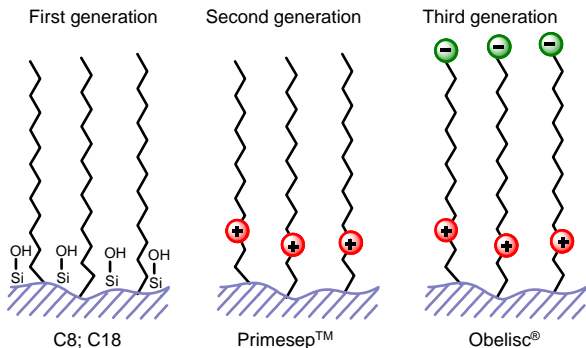
Abstract

For decades, liquid chromatography stationary phase design has been dominated by the idea of eliminating multiple, or "unwanted", interactions that occur in mixed-mode separations. In reversed-phase chromatography base-deactivated phases were developed to eliminate silanol interactions with amine-containing analytes.

However, there are ways to benefit from multiple interactions on the stationary phase. SIELC Technologies was a first company that introduced Primesep - mixed-mode columns intentionally designed for multiple interactions. Now we offering a new generation of stationary phases, Obelisc®, an evolutionary step in mixed-mode column technology. These columns are capable of separating a tremendous range of compounds by different separation modes based only upon mobile phase selection.

The ligand structure includes positive and negative charges separated by a long organic chain allows both positive and negative charges to simultaneously participate in electrostatic interaction. Two complementary columns Obelisc R for reverse phase separation and Obelisc N for normal separation is differ in polarity of the long organic chain connected two opposite charges. Obelisc R has hydrophobic chain making the surface of the stationary phase hydrophobic in nature while Obelisc N has hydrophilic chain making this column suitable for HILIC, SFC and other normal phase applications.

Three generations of mixed-mode stationary phases



Conclusions

Mixed-mode columns that contain two types of interactions, ion-exchange and reversed-phase, or ion-exchange and normal phase with both positively charged and negative charged functional groups are first stationary phases of third generation of mixed-mode LC. Buffer concentration, buffer pH, and organic modifier concentration are three factors that allow to adjust selectivity and retention and obtain most convenient peaks spreading. Retention characteristics of polar compounds are significantly improved compared to traditional reversed-phase chromatography. Low buffer concentration is sufficient to control ion-exchange mode of interaction. High column capacity is typical with polar analytes. Mixed-mode type of stationary phases eliminates blind multiple-column search, and allows a systematic approach to method development.