Enantioseparation of Chiral Antimycotic Drugs by HPLC with Polysaccharide-Based Chiral Columns and Polar Organic Mobile Phases with Emphasis on Enantiomer Elution Order

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Annotation

Approximately 40% of plant protection products currently in use involve chiral active ingredients. The enantiomers of pesticides exhibit identical physicochemical properties in isotropic environments, but they may have different activities and toxicities due to interactions with enzymes or naturally asymmetric molecules. This difference can also lead to variations in the rate of biotic degradation, making one enantiomer more resistant than the other.

In this study, the enantiomeric separation of 10 chiral antimicotic drugs was investigated using polysaccharide-based chiral stationary phases and polar organic mobile phases. Special attention was given to interesting examples of changes in the enantiomeric elution order (EEO), which depended on the chiral selector type, the separation temperature, the main component of the mobile phase, and minor additives. Specifically, it was found that the elution order of the enantiomers of the chiral drug terbinafine was reversed on cellulose- and amylose-based columns, even though they had the same substituent group. Another chiral drug, bifonazole, showed a reversed elution order of its enantiomers on two amylose-based selectors with different substituents. Additionally, the elution order of terbinafine enantiomers changed on several columns when the alcohol-based mobile phase was replaced with acetonitrile. The effect of minor acidic (formic acid) additives in the mobile phase on the elution order of terbinafine enantiomers was studied on Lux Cellulose-2 and Lux Cellulose-4 columns. Furthermore, the reversal of the elution order of bifonazole enantiomers was observed on the Lux Amylose-2 column with a change in temperature.