

Separation of Methorphan Enantiomers and Metabolites Using Supercritical Fluid Chromatography-Tandem Mass Spectrometry (SFC-MS/MS):

Method Development and Optimization

Tinatini Varvaridze, Bezhan Chankvetadze

E-mail: tinatini.varvaridze890@ens.tsu.ge

Department of Chemistry, Faculty of Exact and Natural Sciences, Ivane Javakhishvili Tbilisi State University,

3 Ilia Chavchavadze Avenue, Tbilisi 0179, Georgia

This bachelor's thesis addresses one of the most challenging problems in modern analytical chemistry: the enantioselective separation of chiral drugs, specifically methorphan enantiomers and their metabolites. The study focuses on the two isomers of methorphan: dextromethorphan (DXM), widely used in medicine as an antitussive, and its mirror-image antipode – levomethorphan (LVM), a potent opioid narcotic. Their precise identification is critically important for clinical toxicology and forensic investigation.

The thesis provides a detailed description of the development of an enantioselective analysis method using supercritical fluid chromatography coupled with tandem Mass Spectrometry (SFC-MS/MS). As part of the research, an extensive screening of various chiral columns was performed, along with the optimization of the mobile phase composition. The optimal conditions for the simultaneous separation of DXM/LVM and their metabolites (dextrorphan da levorphanol) were experimentally determined.