

Abstract

This thesis is focused on the development of an UHPLC-MS/MS method for the determination of lactone and carboxylate form of topotecan in aqueous buffers (Part 1) and on the development of a HPLC-MS/MS method for monitoring the extraction efficiency of 6 organic UV filters from aqueous matrices using deep eutectic solvents and terpenes (Part 2).

Topotecan is an important anticancer drug that inhibits topoisomerase I, but only its lactone form is pharmacologically active. In the first part of this work, the change in the ratio of lactone and carboxylate form of topotecan in time was studied as a function of sample pH and the pH of the aqueous component of the mobile phase. For this purpose, a 19-minute UHPLC-MS/MS method with a C18 stationary phase, gradient elution and electrospray ionization in positive mode was developed. It was observed that with an increasing pH of the mobile phase and the pH of the sample, the mass fraction of the carboxylate form of topotecan in the sample increased as well. The same trend was also observed with increasing time since sample preparation. If methanol was added to the sample, a stabilization of the lactone form and a slower transition to the carboxylate form was observed. These findings can be further exploited to optimize the use of topotecan in medicine.

The effective removal of organic UV filters from aquatic environmental compartments and wastewater is very important because even low concentrations of these substances, considered endocrine disruptors, are dangerous for humans and wildlife. The second part of this work was focused on the analysis of selected benzophenone-based UV filters (BP, BP-1, BP-2, BP-3, BP-8, MOBP) and their extraction from aqueous matrices. For this purpose, a 10-minute HPLC-MS/MS method with C18 stationary phase, gradient elution and electrospray ionization in positive mode was developed. In total, 10 deep eutectic solvents (DES) were prepared, DESs represent a more environmentally friendly alternative to expensive and difficult to recycle traditional organic solvents. Their extraction efficiency was also compared with the extraction of selected analytes by two terpenes – terpineol and linalool. Terpineol alone was found to be the most efficient extraction reagent, and among the used DESs, the composition with menthol:caprylic acid in molar ratio 1:1 was the most effective, it extracted all the studied analytes with an efficiency higher than 99.6 %.