SUMMARY

Ionic liquids (ILs) are a diverse group of chemical compounds, in terms of structure and properties, consisting solely of ions. In chemical terms, they are salts whose melting point are below 100°C, and sometimes even below room temperature. Ionic liquids, due to their unique properties, are widely used in many areas of life and economy. Chemical industry and its closely related pharmaceutical industry are branches of the economy intensively benefiting from scientific achievements in the field of ionic liquids.

The research described in this dissertation focuses mainly on the assessing usefulness of ionic liquids as mobile phase modifiers in liquid chromatography of basic drugs, whose retention in reversed-phase system is impeded (primarily due to the strong silanol interactions). Because of the fact, that most of the APIs present in medicines are polar substances, often in the form of organic bases, this subject matter is all the more important as it concerns a large part of pharmaceutical industry. In the studies described, ionic liquids were used in reversed-phase systems, mainly in thin-layer chromatography (RP-TLC, RP-HPTLC), as well as in thin-layer chromatography coupled with mass spectrometry (RP-TLC-MS).

Optimized methods of densitometric determination employing 1-alkyl-3-methylimidazolium derivatives enabled fast, simple, cheap and reproducible chromatographic analysis of pharmaceutical formulations, as well as complex matrices (plasma). The conducted research proved that both cationic and anionic part of ionic liquids can take an active part in the chromatographic separation process of analytes, and their qualitative and quantitative analysis. The use of the ionic liquids ensures better performance of the chromatographic process, compared to the traditional mobile phase modifiers such as: ammonia, dimethylamine, trimethylamine. Faster chromatographic separation and clear improvement of analyte retention parameters in these modified systems results from greater strength and diversity of intermolecular interactions. The conducted research, proved also that a small 1.5% (v/v) addition of ionic liquid to the mobile phase composition can also be an important factor improving the ability to predict lipophilicity using the TLC method. The obtained QSRR models proved to be useful in predicting the physiochemical properties of compounds such as neuroleptics, but these results suggest that they may be also useful in assessing new, and other base compounds.

Keywords: ionic liquids, liquid chromatography, silanol groups, densitometry, lipophilicity parameters