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Suitability of 1-hexyl-3-methyl imidazolium ionic liquids for the analysis of pharmaceutical formulations containing tricyclic antidepressants

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Highlights

- A simple RPLC procedure to analyse tricyclic antidepressants was developed
- Mobile phases in the absence and presence of imidazolium ionic liquids are compared
- A strong overloading effect was observed with C18 columns and HMIM·BF_4
- The best conditions were obtained with a C8 column and HMIM·Cl
- Extensive validation along several weeks demonstrated the feasibility of the procedure

Abstract

The reversed-phase chromatographic behaviour of six tricyclic antidepressants (amitryptiline, clomipramine, doxepin, imipramine, nortryptiline and maprotiline) was examined in this work with acetonitrile-water mobile phases, in the absence and presence of the ionic liquids 1-hexyl-3-methyl imidazolium chloride and 1-hexyl-3-methyl imidazolium tetrafluoroborate, which have interesting features for the separation of basic compounds, in terms of peak shape combined with reduced retention. Tricyclic antidepressants are low polarity drugs that strongly associate to the alkyl chains of conventional stationary phases. They are also positively charged in the usual working pH range (2–8) in reversed-phase liquid chromatography, due to their strong basic character. In consequence, they may interact with the residual ionised silanols present in conventional silica-based stationary phases, which is translated in stronger retention, and tailed and broad peaks. A simple chromatographic procedure for the control of tricyclic antidepressants in pharmaceutical formulations was ~~is~~ developed using a C8 column and a mobile phase containing 30 % acetonitrile/10 mM 1-hexyl-3-methylimidazolium chloride at pH 3, with UV detection. Intra- and inter-day precisions were usually below +1.0%, and intra- and inter-day bias (trueness) ranged usually between –2.1% and +2.4%, and between –3.0% and +2.3%, respectively.~~Satisfactory recoveries were achieved, with intra- and inter-day relative standard deviations ranging between –2.1 and +2.4% and between –3.0 and +2.3%, respectively.~~ Sample preparation was simple and only required solubilisation and filtration previous to injection.

Keywords: Tricyclic antidepressants; 1-Hexyl-3-methylimidazolium chloride; Pharmaceutical formulations; Method validation;

1. Introduction