Analysis of sodium diclofenac and carbamazepine by surface acoustic wave nebulization – mass spectrometry
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Abstract

This thesis describes the potential of surface acoustic wave nebulization (SAWN) for the analysis of sodium diclofenac (DCF) and carbamazepine (CBZ) by mass spectrometry (MS). The optimum solvent mixture compositions (MeOH-H2O, LC/MS grade) were determined for ESI-MS and SAWN-MS. The results showed SAWN-MS compatibility with all the tested solvent mixture compositions, whilst for ESI-MS, a decrease in signal-to-noise (S/N) intensities was observed with the increase in the water content, with a lack of signal above 50% H2O, v/v. SAWN-MS and ESI-MS produced the same type of ions for the tested compounds in the optimum conditions. Higher amount of salt adducts was observed with SAWN-MS when using 100% H2O. Calibration curves were constructed for DCF and CBZ by SANW-MS in 100 % water (LC/MS grade). From the calibration curves, the limits of detection (LODs) and limits of quantification (LOQs) were determined according to the calibration curve slope method, as well as by the visual approximation method (LOD=3x(S/N); LOQ=10x(S/N)). The corresponding LOD and LOQ for the molecular ion of DCF were estimated between 1.5 â€“ 1.71 ppb and 5.0 â€“ 5.72 ppb respectively, and for the molecular ion of CBZ between 0.3 â€“ 0.55 ppb and 1.0 â€“ 1.48 ppb respectively. Surface water samples spiked with DCF and CBZ were analyzed by SAWN-MS after simple filtration. No detection of DCF and CBZ was achieved and the SAWN chip was severely damaged. Depending on the nature and complexity of the environmental water sample, further sample treatment steps might be required to enable the analysis of these compounds in surface water samples. Future recommendations for further research on SAWN were proposed.