

## Novel Magnetic Solid-Phase Microextraction Approach with Ionic Liquids and a Surfactant as Coating Materials for Pretreatment of Biological Samples

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### Summary

Sample pretreatment based on magnetic nanoparticles (MNPs) can be considered an interesting alternative compared to LLE and SPE because of high specific surface area and the possibility of their separation from the matrix using external magnetic field. It allows to miniaturize the sample preparation procedure and reduce consumption of harmful organic solvents. However, the functionalization of magnetic sorbents by delivering the functional groups on their surface is required for obtaining high extraction efficiency. In recent years, the increased utilization of ionic liquids (ILs) and surfactants in the method development has been observed due to their structural diversity, unique and eco-friendly properties [1,2]. On the other hand, there are no papers reporting the use of these compounds as coating materials of MNPs for drug extraction from biological fluids.

In the study, ten different ILs and a double-chained surfactant in the functionalization of Fe<sub>3</sub>O<sub>4</sub> MNPs were tested. The influence of the cation, anion, length and amount of alkyl substituents in these structures in respect to the extraction results of the prepared MNPs was evaluated. They were also used in combination with silica as a coating material. The most effective MNPs were characterized by FT-IR, XRD, TG and TEM techniques [3], and applied for the isolation of epirubicin from biological fluids before liquid chromatography with fluorescence detection (LC-FL) [4]. The developed method was optimized and validated according to the FDA and ICH criteria. Linearity was confirmed in the range of 1-1000 and 1-10000 ng/mL for plasma and urine samples, respectively. The extraction efficiency was ≥ 80 %. Finally, the MNP-LC-FL method was successfully applied for epirubicin quantification in real clinical samples collected from a pediatric cancer patient. Summarising, a novel magnetic solid-phase microextraction approach based on a double chained surfactant for pretreatment of biological samples was developed as an interesting alternative to others in pharmaceutical and clinical investigations.

### References

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