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Melamine sponge decorated with copper sheets as a novel material for microextraction of sulfonamides prior to their determination by high-performance liquid chromatography

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Highlights

- Melamine sponge decorated with copper sheets was prepared as a novel material
- The material was used as an adsorbent for the microextraction of sulfonamides
- The mechanism of interaction with sulfonamides was studied
- A method for the determination of sulfonamides was developed and validated

Abstract

In this study, the modification/loading of melamine sponge with metallic copper sheets (CuMeS) is discussed. The CuMeS is prepared in a fast, singe-step procedure, where concurrent production of copper oxides is avoided. The surface of the resulting CuMeS is hydrophobic, after it have been dried, also, enabling hydrophobic-based applications. The as-prepared CuMeS was utilized to develop a sensitive and selective sample preparation procedure to extract sulfonamides (SAs) from milk and water samples. To the best of our knowledge, this is the first time that the benefits of the high affinity of copper for SAs are reaped for analytical purposes. Due to the high selectivity, the proposed CuMeS-based procedure acts both as an extraction and as a clean-up step for the quantitative determination of SAs. The analytical method developed herein, which is based on the extractive potential of CuMeS, has the merits of wide linearity (including concentration above and below the maximum residue limit of SAs), low limits of quantification (0.025-0.057 μg L^{-1} for lake water and 0.23-1.05 μg L^{-1} for milk samples), high enrichment factors and highly satisfactory recoveries and repeatability. The analytical method was validated according to the Commission Decision 657/2002/EC. Owing to the low cost of CuMeS and the straightforward procedure followed, the proposed method can be applied to routine analysis of SAs.