Cloud Point Extraction for the Determination of Copper, Nickel, Zinc and Irons in Environmental Samples by Flame Atomic Absorption Spectrometry

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A cloud point extraction procedure was presented for the preconcentration of copper, nickel, iron and zinc ions in various samples. After complexation with 3-(indolin-3-yl)(phenyl)methyl indoline (IYPMI) in basic medium, analyte ions are quantitatively extracted to the phase rich in Triton X-114 following centrifugation. 1.0 mol L\(^{-1}\) HNO\(_3\) nitric acid in methanol was added to the surfactant-rich phase prior to its analysis by flame atomic absorption spectrometry (FAAS). The adopted concentrations for IYPMI, Triton X-114 and HNO\(_3\), bath temperature, centrifuge rate and time were optimized. Detection limits (3SDb/m) of 1.6, 2.1 and 1.9 ng mL\(^{-1}\) for Cu\(^{2+}\), Co\(^{2+}\) and Ni\(^{2+}\) along with preconcentration factors of 30 and for these ions and enrichment factor of 65, 58 and 67 for Cu\(^{2+}\), Ni\(^{2+}\), Fe\(^{3+}\) and Zn\(^{2+}\) respectively. The high efficiency of cloud point extraction to carry out the determination of analytes in complex matrices was demonstrated. The proposed procedure was applied to the analysis of biological, natural and wastewater, soil and blood samples.