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Sensitive determination of cadmium in lake water, municipal wastewater and onion samples by slotted quartz tube-flame atomic absorption spectrometry after preconcentration with microextraction strategy

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Abstract

This study presents the coupling of slotted quartz tube with flame atomic absorption spectrometry for the determination of cadmium after preconcentration with dispersive liquid-liquid microextraction. A bipyridine ligand was used to form covalent cadmium complex, and the formation yield was increased by optimizing parameters such as pH/amount of buffer solution and ligand concentration. Parameters that influence the extraction output and slotted quartz tube efficiency were also optimized to increase the sensitivity. The optimization steps added up to give about 135 times increased sensitivity in comparison to the conventional flame atomic absorption spectrometry. The limits of detection and quantification obtained under optimum experimental conditions were 0.31 and 1.04 $\mu\text{g L}^{-1}$, respectively. Applicability of the method was tested on lake water, municipal wastewater and onion samples spiked at different concentrations. Percentage recoveries were found to be between 84 – 105% for the samples, and matrix matching was used to obtain 98.6% recovery for onion spiked at 20 $\mu\text{g L}^{-1}$.

Keywords: Cadmium, DLLME, SQT, FAAS

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