Advanced Method for Toxic Antimony (Sb) Detection in Environmental Water

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Abstract:

The rising concern over trace antimony (Sb) contamination in water stems from its harmful effects on ecosystems and living organisms. As a result, there is a growing demand for analytical methods capable of detecting Sb at ultra-low concentrations. This study presents an optimized approach for the extraction, preconcentration, and determination of Sb in water, leveraging a newly synthesized adsorbent material, M@GONIO. This innovative compound facilitates the extraction and preconcentration of Sb from aqueous samples via magnetic solid-phase extraction, making it a promising tool for environmental water decontamination.

The analytical method includes a second preconcentration step using hydride generation coupled on-line with graphite furnace atomic absorption spectrometry (GFAAS). This dual preconcentration strategy significantly enhances sensitivity, achieving a detection limit (LOD) of 0.0018 µg/L, a quantification limit (LOQ) of 0.0060 µg/L, and a relative standard deviation (%RSD) of 2.22 for a 0.1 µg/L standard. These parameters highlight the method's exceptional sensitivity, precision, and suitability

for trace Sb detection, addressing critical needs in environmental monitoring and toxicological assessment.

Keywords:

Toxic elements, antimony, magnetic solid phase extraction, graphite furnace atomic adsorption spectrometry, magnetic graphene oxide.