Spectrophotometric determination of trace concentrations of copper in waters using the chromogenic reagent 4-amino-3-mercapto-6-[2-(2-thienyl)vinyl]-1,2,4-triazin-5(4H)-one: Synthesis, characterization, and an analytical application.

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Abstract

A rapid, simple, and inexpensive spectrophotometric method is described for the determination of trace concentrations of Cu2+ in water based on its reaction with 4-amino-3-mercapto-6-[2-(2-thienyl)vinyl]-1,2,4-triazin-5(4H)-one (AMT). The electronic spectrum of the brown product exhibits a sharp, well-defined peak at λmax = 434 nm with a molar absorptivity (ε) and Sandell's sensitivity of 1.9×104 L mol^{-1} cm^{-1} and 0.003 μg cm^{-2}, respectively. The absorbance of the Cu(II)-AMT complex obeys Beer's law over a 0.7-25 μg mL^{-1} range with a limit of detection and limit of quantitation of 0.52 and 1.72 μg mL^{-1}, respectively. Validation of the proposed method is established by analysis of copper (II) in actual sea and tap water samples. The results are compared with data obtained from copper concentration measurements using inductively coupled plasma optical emission spectrometry. The chemical structure of the Cu(II)-AMT complex is fully characterized by FT-IR, SEM, EDX, TGA, and ESR techniques.

- **Key words**

  Copper ion; Spectrophotometry; Characterization; Water samples.

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