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Hydrogen bonding recognition and colorimetric detection of isoprenaline using 2-amino-5-mercapto-1,3,4-thiadiazol functionalized gold nanoparticles

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Abstract

In this paper, we describe a rapid, low-cost and highly sensitive colorimetric method for the detection of isoprenaline, based on 2-amino-5-mercapto-1,3,4-thiadiazol (AMTD) functionalized gold nanoparticles (AMTD-AuNPs) as a sensing element. Hydrogen bonding interaction between isoprenaline and AMTD resulted in the aggregation of AuNPs and a consequent color change of AuNPs from red to blue. The concentration of isoprenaline could be detected with the naked eye or a UV-visible spectrometer. Results showed that the absorbance ratio (A_{650}/A_{524}) was linear with isoprenaline concentrations in the range of 0.2 to 2.6 μM ($R=0.997$). The detection limit of this method was 0.08 μM . The proposed method is simple, without using complicated instruments and adding salts for enhancing sensitivity. This probe could be successfully applied to the determination of isoprenaline in human serum samples and urine samples after deproteinization.

Keywords: 2-amino-5-mercapto-1,3,4-thiadiazol, hydrogen bonding interaction, colorimetric detection, isoprenaline, gold nanoparticles

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