



Determination of acetone by a colorimetric method based on gold nanoparticles

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The simple and rapid method for acetone detection was proposed based on the colorimetric analysis of gold nanoparticles (AuNPs). The AuNP and functionalized AuNP with 4-aminothiophenol showed a maximum absorption wavelength at 522 and 657 nm, non-aggregated and aggregated forms, respectively. It was found that the absorption intensities of AuNPs depend on the concentration of acetone due to the reaction between acetone and 4-aminothiophenol producing 4-(propan-2-ylideneamino)benzenethiol lead to a non-aggregated forms of AuNPs. The calibration curve between the absorbance ratio (A_{522}/A_{657}) and the concentrations of acetone provides a linear dynamic range from 0.068-3 μM ($r^2 = 0.9885$). The limit of detection (LOD), relative standard deviation (RSD) and relative error were obtained at 0.0504 μM , 0.16 (n=3) and 13.5, respectively. In addition, the interference study revealed that xylene, ethanol and 2-propanol has no affect on the intensity. In the future, the gold nanoparticle-based colorimetric sensor will be applied for the determination of acetone in breath.

Keywords: Acetone; Gold nanoparticles (AuNPs); Colorimetric sensor