

SIMULTANEOUS DETERMINATION OF ASCORBIC ACID AND GALLIC ACID BY MONITORING SILVER NANOTRIANGLE FORMATION

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Antioxidant compounds have an important role in human health owing to some benefits, such as radical scavenging properties, which can decrease the prevalence of vascular diseases or cancer. Polyphenols are the most relevant group of antioxidant substances and the total content of these compounds has been traditionally estimated using the Folin Ciocalteu method. However, this method is affected by the presence of other reducing substances, such as sugars or ascorbic acid, so an overestimation of total polyphenol content can be obtained. The method presented here is aimed at the simultaneous determination of ascorbic acid and phenolic antioxidants, using gallic acid as the model analyte.

The method is based on the formation of silver nanotriangles observed by reacting silver nanoparticles of small size (10 nm), silver nitrate and citrate with ascorbic and gallic acid. Under the experimental conditions assayed, the formation of silver nanotriangles was confirmed by the use of TEM images (Figure 1) and UV-vis absorption spectra. Silver nanotriangles exhibit two different absorption maxima (410 and 590 nm), which allow the use of the proportional equation method to solve mixtures of ascorbic and gallic acids. A systematic study of the variables involved in the process has been performed in order to obtain additive signals to solve the equation system for binary mixtures.

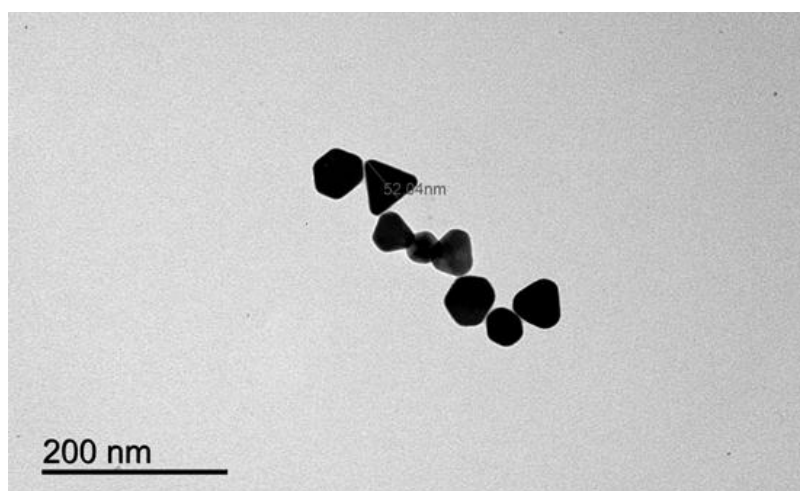


Figure 1. TEM image of silver nanotriangles obtained by mixing 20 μM of ascorbic and 20 μM gallic acids in the presence of AgNO_3 and citrate

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