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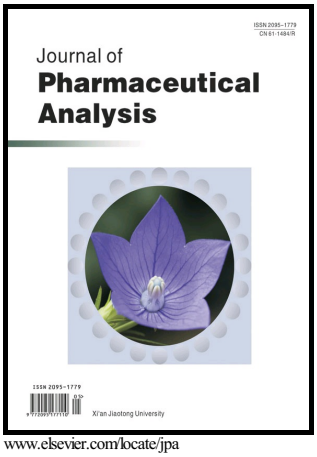

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Simultaneous colorimetric determination of morphine and Ibuprofen based on the aggregation of gold nanoparticles using partial least square

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Abstract:

In this work a new method is presented for simultaneous colorimetric determination of morphine(MOR) and ibuprofen(IBU) based on the aggregation of citrate-capped gold nanoparticles (AuNPs). Citrate-capped gold nanoparticles were aggregated in the presence of morphine and ibuprofen. The difference in kinetics of AuNPs aggregation in the presence of morphine / ibuprofen was used for simultaneous analysis of morphine and ibuprofen. The formation and size of synthesized Au NPs and the aggregated forms were monitored by infra-Red (IR) spectroscopy and transmission electron microscopy (TEM) respectively. . By adding morphine or ibuprofen the absorbance was decreased at 520 nm and increased at 620 nm. The difference in kinetic profiles of aggregation was applied for simultaneous analysis of MOR and IBU using partial least square regression as an efficient multivariate calibration method. The number of PLS latent variables was optimized by leave-one-out cross-validation method using predicted residual error sum of square. The proposed model exhibited a high capability in simultaneous prediction of MOR and IBU concentrations in real samples. Our results showed linear ranges of 1.33-33.29 µg/ mL (R^2 = 0.9904) and 0.28-6.9 µg/ mL (R^2 = 0.9902) for MOR and IBU respectively with low detection limits of 0.15 and 0.03 µg/ mL(S/N=5).

Keywords: Morphine, Ibuprofen, simultaneous determination, AuNps, partial least squares

1. Introduction

Analytical methods based on the spectrophotometric measurements, such as UV-Vis, have attracted increasing interest due to their availability, simplicity and ease of operation