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Determination of γ-terpinenes in *Bunium persicum* essential oil by voltammetric method using gold nanoparticles modified glassy carbon electrodes

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Background and Aims: Several analytical techniques for the determination of γ-terpinene in Bunium Persicum essential oil have been reported. In this study, a new method using a glassy carbon electrode modified with gold nanoparticles (GNPS/GCE) was developed and validated for determination of γ-terpinene, most abundant constituent of Bunium Persicum fruit essential oil.
Methods: The electrochemical behavior of γ-terpinene at the modified sensor was characterized by cyclic voltammetry, chronocuolometry, linear sweep voltammetry, differential pulse voltammetry and rotating disk electrode voltammetry.
Results: Electrochemical parameters such as the diffusion coefficient (D), electron transfer coefficient (α), electron transfer rate constant (k) and ionic exchange current density (io) were determined for the oxidation of γ-terpinene on the surface of electrodes. The oxidation of γ-terpinene on the GNPs/GCE in acetonitrile (0.1 M LiClO4) at a scan rate of 25 mV s−1 were successfully conducted by differential pulse voltammetry. The peak current increased linearly with the concentration of γ-terpinene. The results show that the plot of peak current versus γ-terpinene concentration is linear in the range of 1.2×10-2 M - 1×10-4 M. From the analysis of these data, we estimate that the detection limit of γ-terpinene is 5×10-5 M.
Conclusions: A new and selective method was developed for the measurement of γ-terpinene. This method was successfully applied to the determination of γ-terpinene in Bunium Persicum fruit essential oil.

Keywords: γ-terpinene; Gold nanoparticles; *Bunium Persicum*; Voltammetry methods