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, chronocoulometry, 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