Spectroelectrochemical Studies of Interactions between Vitamin A and Nanocolloidal Silver

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The electrochemical stability of retinyl palmitate (RP) known as Vitamin A in mixed water/ethyl alcohol solutions containing NaCl or NaNO₃, in the absence and presence of silver nanoparticles (nAg) was investigated by cyclic voltammetry (CV) recorded on platinum electrode. The chemical interaction between retinyl palmitate and silver nanoparticles was also studied using UV-Vis spectrophotometry applied on the above mentioned media. The experimental results obtained from UV-Vis spectrophotometry showed that in the presence of NO₃⁻ ions, weak RP-nAg interaction takes place, while in the presence of chloride ions a significant change in environment composition has been highlighted due to the occurrence of instantaneous RP-nAg interaction. The cyclic voltammetry displayed different shapes of cyclic voltammograms recorded on platinum electrode in water/alcohol solutions containing RP and RP/nAg in the presence of NO₃⁻ ions compared to those recorded in Cl⁻ presence due to the specific interaction RP-nAg depending on the anion type. Thus, NO₃⁻ addition leads to mainly electrochemical interaction compared to Cl⁻ presence that favors chemical RP-nAg interaction. Based on the cyclic voltammetry results obtained in the presence of NO₃⁻ ions, the electrochemical decomposition mechanism of Vitamin A was proposed.

Keywords: Retinyl palmitate; Silver nanoparticles; Cyclic voltammetry; UV-Vis spectroscopy.

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