The Antiradical Properties of Different Antioxidants depending on pH Detected by the Photochemiluminescence Method

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The method of photochemiluminescence (PCL) detection of antiradical activity of non-enzymatic antioxidants is based on a photochemical generation of free radicals by UV-irradiation in the assay system including *luminol as* photosensitizer. A sensitivity of the PCL assay lies within nmol concentration of substances. Since this PCL measuring method is simple, fast and convenient, it is useful for different medical tasks and scientific experiments, but required high pH. The purpose of the present work was to study a pH-dependence of the antiradical efficiency of different antioxidants. It was obtained the dependences of PCL lag-phases (*Vitamin C, uric acids, Trolox*) or the relative intensity ($\sqrt{Io/I}$) on the concentration of the antioxidants inhibited PCL integrally (*α-tocopherol, glutathione, phenozan K, anphen*), which characterized by the tangents of the angle of the slope of the straight lines depending on pH. The main kinetic parameters - stoichiometric coefficient (f) and effective constant of inhibition $(K_{InH})_{eff.}$ were estimated for water-soluble natural (*ascorbic* and *uric* acids*)* and synthetic antioxidants: *Trolox* as a standard, phenolic ones - *phenozan K* and *anphen;* $(K_{InH})_{eff}$ – for *glutathione* and lipid-soluble *α-tocopherol.* It was found that the values of f-coefficient decreased and $(K_{InH})_{eff}$ increased in several times while 7.5<pH<11.0. The following order of $(K_{InH})_{eff}$ was observed independent on pH: *Trolox>Vitamin C>uric acid>phenozan K>anphen;* a total inhibitory efficiency (f) was higher for *uric* acid, which can be explained by the number of potentially active OH-groups. In opposite, $(K_{InH})_{eff}$ for *glutathione* was diminished within this pH range. A slight dependence of $(K_{InH})_{eff}$ on pH was observed for *α-tocopherol and Trolox* in measuring system for lipid-soluble antioxidants. It was found a pH-dependence of the initial rates of free radicals generation – $(Wi)_{eff}$ in water-buffer system: it increased at higher pH as well. An original manner named as "pH jump" has been developed for water-soluble antioxidants giving PCL lag-phase to approximate the data to reduced pH. It was concluded that antiradical capacity of different antioxidants tested by PCL method significantly depend on pH, it should be take into consideration in discussing of the data.