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## Gallic acid, a natural antioxidant, in aqueous and micellar environment: spectroscopic studies

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The spectroscopic properties of gallic acid (GA) and their modification with ionization state in aqueous and micellar environment have been studied. Results show that GA absorbance and fluorescence maxima are pH dependent. It is shown by the shift of the absorbance maximum from 272 nm at pH 2.8 to 260 nm at pH 7. These results are accompanied by fluorescence changes in the intensity, red shift of the position of the emission maximum, shape of the spectrum and quantum yield. Observed changes indicate on the existence of two forms of GA resulting from the proton dissociation at COOH group: neutral form which exists below apparent pKa at 3.4 and anionic form above that pH. To develop a basis for monitoring the interactions of GA with biological compound its absorption and fluorescence properties in heterogeneous and non-polar media has been studied. No significant partition under physiological conditions was observed. The binding of GA anion to cationic micelle was observed which occurred by electrostatic interaction. In protic solvents GA molecules form very efficiently hydrogen bonds which strongly influence its spectroscopic properties. In low polarity and nonprotic solvents GA fluorescence is characterized by enhance in the fluorescence quantum yield and a blue shift in the emission maximum, however, in dioxane its behavior is closer to those observed in protic solvents. In view of the role played by antioxidant properties of some food, including red wine, and some natural drugs these results are relevant to future studies of GA in those materials during its action to fulfill its protective role.