Antioxidant activity of phenolic acids in the nonionic micellar system

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Phenolic compounds are a complex group of substances that have attracted considerable attention due to their role in maintenance of flavor and color characteristics of food as well as in protecting human health. Many of the benefits of phenolic-rich foods consumption are due to their antioxidant activities. The efficiency of a phenolic antioxidant will depend upon the reactivity of its phenolic groups and locations of the radical and the antioxidant in the microheterogeneous food system. The rate of the reaction between an antioxidant and a radical totally incorporated within a microphase will be determined by the antioxidant hydrophobicity. The hydrophobicity will strongly influence its distribution between the microphase and the external medium as well as its location inside the microphase.

To address these two aspects, the reactivity of diphenylpicryl hydracil radicals (DPPH) towards cumaric (CA), ferulic (FA) and caffeic (CAA) acids was investigated in the Triton X-100 micellar solution of various concentrations (0.001M, 0.003M and 0.005M) and at different temperatures. Micellar solutions are often used as simple models of food. The presence of TX-100 micelles increased the rate of DPPH consumption for all investigated acids. The effect was most noticeable for p-cumaric and caffeic acids which are insoluble in water. For ferulic acid, which is soluble in water, the kinetics was the slowest because both reagents (DPPH and FA) were located in different microphases.