

Reactions of Radicals and Antioxidants at Designed Interfaces

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Oxidation processes are a major challenge of the chemical stability of food. In dispersed systems, oxidation processes are mainly located at the interfaces. Different former studies demonstrated that to inhibit lipid oxidation several factors have to be considered like the location of antioxidants, their chemical microenvironment, and the interactions between the emulsifier and the antioxidants within the interface that is conditioned by the characteristics of the emulsifier used. This study investigates the importance of the molecular environment of the radicals. To determine the location of radicals, stable nitroxide radicals of different polarity are used and their reduction by alpha-tocopherol and Trolox were compared in different charged micelles. The radical reduction, mobility and partitioning between the micellar phase and the aqueous phase are studied by electron paramagnetic resonance (EPR). To locate the nitroxides in the interfaces formed by the emulsifiers nonionic Brij 58, anionic SDS and the cationic CTAB, $^1\text{H-NMR}$ spectra were recorded and T_1 measurements were carried out.

It could be shown, that the proportion, the location, and the mobility of the radicals in the water-micelle interface are important factors to reduce the radicals by the antioxidants.