

Determining Polyphenolic Antioxidant Distributions between the Oil, Water and Interfacial Regions of Model Food

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Esters either gallic acid (propyl gallate, PG; octyl gallate, OG and dodecyl gallate, LG) are widely used as antioxidant additives in both food and pharmaceutical industries to prevent lipid peroxidation [1]. Estimating its distribution in food emulsions is important because their efficiency in inhibiting lipid peroxidation depends, among other aspects, on their distribution within the different regions of the system.

In the present work we determined the distribution of PG, OG and LG in Corn oil / acidic water / Tween 20 model food emulsions. Antioxidant partitioning [2] is described by two partition constants, POI and PWI which are determined by analyzing the effects of emulsifier concentration on the observed rate constants (kobs) for the reaction between the hydrophobic 4-hexadecylarenediazonium ion (16-ArN_2^+) and the antioxidant and by determining spectrophotometrically the ratio $\text{PWI} / \text{POI} = \text{PWO}$, that represents the partition constant of the antioxidant in binary corn oil-water system (that is, in the absence of emulsifier).

The results show that PG is distributed between the interfacial, water and oil regions meanwhile OG and LG are mostly located in the interfacial and organic regions. The effects of the emulsifier HLB and nature suggest that an increase in the HLB decreases the %PG in the interfacial region. For instance, %PG in the interface region decreases from about 73% to 50% on going from HLB 10.6 to HLB 16.7 at ~ 0.005 emulsifier volume fraction.

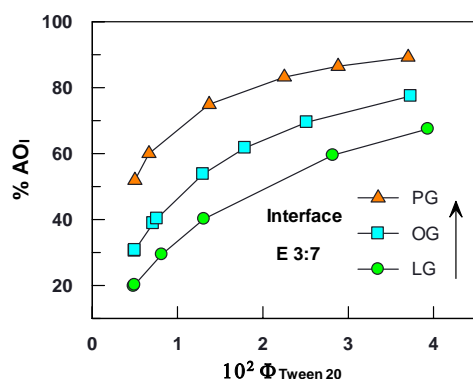


Figura 1. Effects of increasing emulsifier volume fractions (Φ_I) on %AO in the interfacial region of 3:7 o/w emulsion (corn oil/acidic water/tween 20).

References

- [1] E.N. Frankel, A.S. Meyer, *J. Sci. Food Agric.*, 80, 1925-1941 (2000).
- [2] V. Sánchez-Paz, M.J. Pastoriza-Gallego, S. Losada-Barreiro, C. Bravo-Díaz, L.S. Romsted, *Colloid Interface Sci*, 320, 1-8 (2008).