

Emulsifier, pH and Time of Ageing Modify the Balance of Volatile Compounds Produced in Oxidizing Emulsions.

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Foods containing polyunsaturated fatty acids are beneficial for consumer health and well-being. Development of off-flavour, due to formation of odorant volatile compounds resulting from the decomposition of primary products of lipid oxidation, is a major cause of decreased acceptability of these food products. Main chemical pathways for volatile formation have been drawn from experiments generally made on simple model systems. In complex foods such as emulsified products many factors influence reaction kinetics and amounts of oxidation products. The aim of this study was to appreciate the influence of the nature of the emulsifier (proteins vs small surfactant) and of the physicochemical properties of the aqueous phase (pH) on volatile secondary oxidation compounds produced during ageing of oil-in-water emulsions. Emulsions with similar oil droplet size distributions were prepared from sunflower oil purified from non-triglyceride material (30 vol.%) and aqueous phases (pH = 4.0 or 6.5) containing the emulsifier : bovine serum albumin, sodium caseinate or Tween 20 (20 g.L⁻¹). The emulsions were stored in closed flasks at 50°C in the dark. Formation of conjugated dienes (CD) in the oil phase, O₂ concentration (CG-TCD) and release of volatiles (SPME/CG-FID) in the headspace were measured. Nineteen volatile compounds were identified in the headspace of the oxidizing emulsions and quantified using external calibration of SPME-GC/FID. The same compounds were produced for every experimental conditions. Their kinetics of formation continued well-after consumption of total available O₂, CD hydroperoxides remaining constant. Kinetics depended on the volatile, the emulsifier and the pH. This led to distinct and time-dependent volatile profiles as visualised on factorial discriminant analysis (AFD) maps, the main discriminative factor being the nature of the emulsifier and probably induce differences in the odour of the emulsions. Even if no clear conclusion could be drawn from the chemical nature or the origin of the volatile, the differences probably resulted both on changes in oxidation mechanisms and interactions of certain volatiles with proteins, as evidenced by appearance of newly-formed fluorescent compounds in the emulsions. These results highlight the relevance of quantifying more than one volatile compound to evaluate development of lipid oxidation.